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SEPTEMBER/OCTOBER 2001

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and vine performance*

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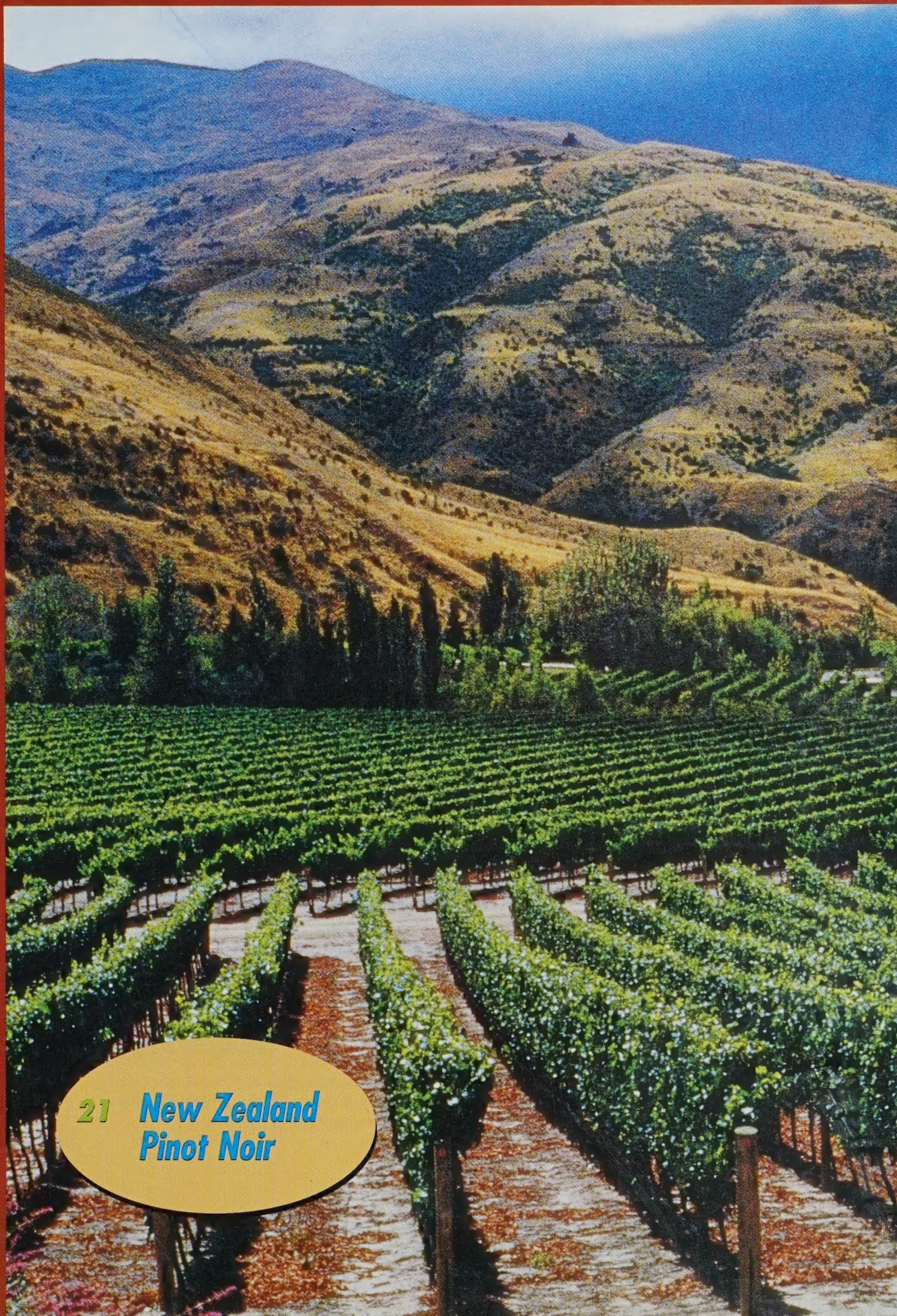
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Leaf canopy structure and vine performance

BY M. Carmo Vasconcelos¹ PhD and Steve Castagnoli²

Achieving consistent yields of high quality grapes in cool climates is challenging. Yields tend to fluctuate from year to year, and optimum maturity may not be reached every season. A short growing season, cool weather, and unfavorable precipitation patterns are factors that may affect the yield and quality of the vintage.

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The research described in this text was done in the southern Willamette Valley, Alpine, OR, 1996/97.

The success of winegrape production in cool climates can often be improved through proper canopy management. Canopy management provides a set of tools that allows grapegrowers to improve the canopy structure and microclimate.

The purpose of the study detailed below was to determine how different canopy management practices and combinations of these practices affect yield, fruit composition, vegetative growth, and carbohydrate reserves in the permanent vine structure. Ultimately, the goal was to provide growers with tools to optimize winegrape production using these practices.

One aspect of canopy structure that should not be underestimated is age distribution of the leaf population. Grapevine leaves are net importers of carbohydrates until they reach 50% to

80% of their final size [18,36]. The photosynthetic rate increases until leaves attain full size (approximately 40 days after unfolding) and decreases steadily thereafter [22,23]. The most efficient leaves in the canopy, therefore, are those that are recently expanded (youngest full-grown leaves). The age of the vine canopy can be manipulated with selective leaf removal and shoot tipping at appropriate growth stages.

Removing shoot tips promotes lateral shoot growth at the nodes closer to the excised tip [13,37]. Lateral shoots developed during the period of active shoot growth will provide additional photo-assimilating surface during fruit ripening.

Lateral shoots become net exporters of carbohydrates as soon as they have two fully expanded leaves [12]. They provide assimilates to support their own growth and export the surplus to the main shoot, contributing to fruit ripening [19]. The most efficient leaves during ripening are located at the top of the canopy and those arising from lateral shoots [6].

Whether to retain, hedge, or remove lateral shoots in grapevine canopies has been a matter of controversy in many winegrape production areas in both the Old World and New World.

Table I. Effect of canopy manipulations on fruit yield and yield components of Pinot Noir grapevines during two consecutive seasons.

	Fruit set %	Berry wt (g)	Berries/cluster	Cluster wt (g)	Clusters/shoot	Shoots/vine	Yield/shoot (g)	Total yield/vine
Tipping								
No	35.4	1.20	92	107	1.71	21.5	186	4.20
Yes	44.3	1.18	104	111	1.70	17.5	204	3.55
Significance (p)	0.0001	ns*	0.0002	0.0002	ns	<0.0001	0.0475	0.0201
Laterals								
Absent	44.9 a*	1.19	100	116	1.65	19.2	192	3.71
Short	37.0 b	1.19	98	115	1.78	19.2	206	4.07
Long	36.6 b	1.19	94	109	1.69	20.1	188	3.84
Significance (P)	0.0177	ns	ns	ns	ns	ns	ns	ns
Season								
Year 1	42.9	1.28	82	104	1.49	18.6	154	2.86
Year 2	36.7	1.10	113	123	1.92	20.4	236	4.89
Significance (p)	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	0.0096	<0.0001	<0.0001

*Values followed by the same letters within main factors and columns do not differ significantly; ns: not significant at the 5% level.

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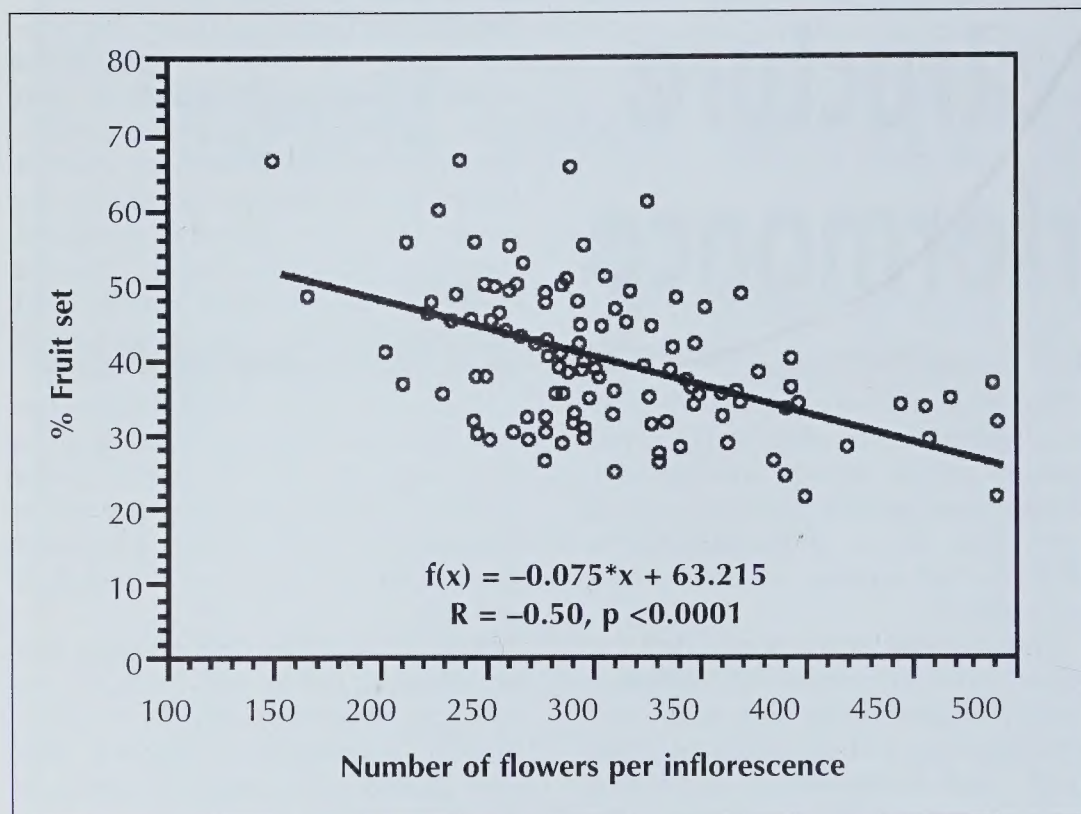


Figure 1: Relationship between number of flowers and percent fruit set of Pinot Noir grapevines subjected to different canopy management treatments. Data were pooled across all treatment factors.

Lateral shoots are undesirable in vigorous vineyards because they lead to crowded canopies, with excessive shading and humidity and poor air circulation resulting in an imbalance favoring vegetative growth over fruit production and increased disease incidence [9,11, 30,31].

In moderate vigor vineyards, lateral leaves improve fruit quality and are the most important contributors to both sugar accumulation in the fruit during ripening and to starch accumulation in the parent vine [4].

Materials and Methods

Experimental design: The experiment was carried out on 180 own-rooted, 17-year-old Pinot Noir grapevines during two consecutive seasons. Vines were spaced 1.83 m x 2.74 m and were cane-pruned to four buds/m² (11 buds/m vine-row) in the first season. They were balance-pruned to 28 buds/kg of one-year-old pruning wood in the second season. The following treatments were applied in factorial combinations:

Shoot tipping: removal of three to four apical leaves at full bloom, or no shoot tipping.

Lateral shoot length: 1. No laterals (laterals removed weekly as they arose, starting at full bloom); 2. short laterals (laterals cut back to four leaves at full bloom, and subsequent lateral growth removed weekly); 3. long laterals (laterals allowed to grow undisturbed).

Leaf removal in the cluster zone four weeks after bloom or no leaf removal: This treatment consisted of removing leaves and lateral shoots opposite the clusters in addition to one leaf immediately above and below the cluster.

Each treatment-combination was replicated five times with three vines per plot in a completely randomized design.

Fruit set: Prior to bloom, one inflorescence per vine was enclosed in a mesh bag to retain all shed flowers. The bags were removed at the end of July, four weeks after full bloom, and all abscised flowers and fruitlets counted. At harvest, these clusters were picked separately, frozen at -20°C, and the number of berries was later counted. The number of flowers was calculated as the sum of shed flowers and berries. Percent fruit set was calculated as the quotient of the number of berries at

harvest and the total number of flowers per inflorescence.

Yield and yield components: The crop was harvested October 1, 1995, and October 17, 1996. The number of clusters per vine was recorded. One hundred berries from each plot were chosen randomly to determine mean berry weight. Cluster weight was obtained by dividing total yield by the number of clusters. The number of berries per cluster was calculated by dividing cluster weight by the mean berry weight.

Fruit composition: A sample of 25 clusters per experimental unit was crushed for determination of soluble solids, pH, and titratable acidity.

Skin anthocyanin content was determined on a 100-berry sample from each experimental unit as described by Candolfi-Vasconcelos and Koblet [4]. An extinction coefficient of E 1% = 380 was used in the calculations [29].

Canopy development and vine vigor: Trunk volume (V) was estimated during pruning in February 1996 and 1997. For this purpose, the trunks were divided into a varying (n) number of sections that were approximately cylindrical in shape and the following formula was used:

$$V = \sum_{i=1}^n \left(\frac{d_i}{2} \right)^2 \cdot \pi \cdot L_i$$

n: number of cylindrical sections. $1 \leq n \leq 3$

d: diameter of the trunk section

L: length of the trunk section

The weight of one-year-old prunings, including woody laterals, was recorded in 1996 and 1997. Cane weight was obtained by dividing pruning weight by the number of canes.

Three shoots per replicate were collected September 9, 1996, for growth analysis. The number of main and lateral leaves were counted. Shoot length and diameter, and primary and lateral leaf area were measured.

The Ravaz Index [27] was calculated by dividing total yield per vine by the pruning weight recorded during the winter following each season.

Wood carbohydrate reserves: During pruning, wood samples from the trunk were collected and carbohydrates were extracted and

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analyzed using the method described by Candolfi-Vasconcelos and Koblet [4].

Statistical analysis: The Statview statistical package was used for statistical analysis of data. Results were subjected to correlation analysis and to a four-way analysis of variance (shoot

tipping X lateral length X leaf removal X season).

The Waller-Duncan k-ratio test was used to compare means. Interactions between factors were rare, and the contribution of interactions to the total variance was very small relative to the main effects. For this reason, we chose

to present only the means of the main effects. For completeness, all significant interactions found are reported in the text. The effect of cluster zone leaf removal was omitted from the tables when there was no significant response (Tables I, IV, and V).

Results and Discussion

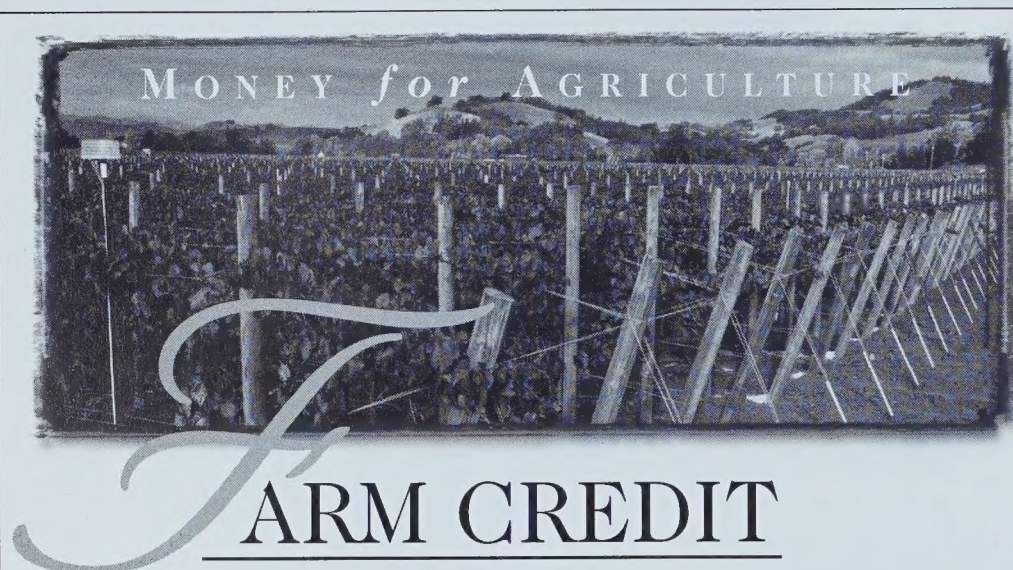
Yield and yield components: Shoot tipping at bloom improved fruit set by 25% (Table I). Additionally, fruit set benefited from lateral shoot removal with a trend toward higher percent fruit set in response to complete removal of lateral shoots. The positive effect of tipping on fruit set has been established in previous studies [4,8,17,34].

Actively growing shoot tips compete with the developing inflorescences for assimilates. During bloom, the leaves in the mid- and upper-shoot section export carbohydrates to the shoot tip [12,18,26]. After hedging, the direction of translocation is reversed; instead of moving up to the shoot tip, assimilates are diverted downward [26] and made available to the developing inflorescences. This is thought to improve fruit set.

During early stages of development, lateral shoots depend on assimilates provided by the main shoot for growth, competing with other vegetative and reproductive sinks [20]. Elimination of all competing vegetative growing tips, either on the main or lateral shoots, increases the pool of available carbohydrates for floral development, which may result in improved fruit set.

Leaf removal in the cluster zone had no measurable effect on fruit set or any other yield component (data not shown). We chose to apply this treatment four weeks after full bloom based on prior research. Leaf removal in the cluster zone in the early stages of berry development can reduce fruit yield, because flower and fruitlet abscission may occur [4].

During bloom, shoots of *V. vinifera* have an average of 16 to 19 unfolded leaves [24]. Under non-stressing conditions at this stage of development, retranslocation of assimilates from the reserves stored in the permanent struc-



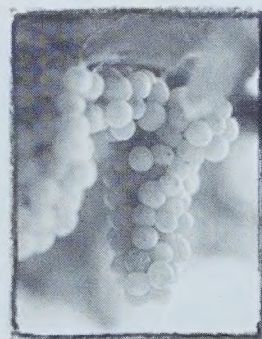
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ture has ceased [35]. The basal leaves are fully expanded and are net exporters of carbohydrates [12,18].

Removal of basal leaves at full bloom equates to the elimination of a significant proportion of the primary source of photoassimilates. Four weeks after full bloom, the main shoot has 25 to 27 unfolded leaves (M. C. Vasconcelos, unpublished data, 1997). Elimination of basal leaves at this stage does not affect fruit set [3,4].

The final number of berries per cluster, cluster weight, and yield per shoot were increased by shoot tip removal, but not by other treatment factors (Table I). These increases largely reflect those observed in fruit set with similar trends in response to lateral shoot removal.

There was no treatment effect on berry weight or bud fertility (clusters/shoot), but there was a significant effect of season (Table I). Removal of mature leaves during the two-week period following bloom reduces bud fertility in the following season [4]. Carbohydrate shortage during this period is critical for fruit production in both the current and following seasons.

The growing season affected yield per vine (Table I) mainly due to the number of buds left per vine after pruning, but also through increased bud fertility and heavier clusters (Table I). Shoot tip removal considerably reduced cane and pruning weights after the first season of implementation of the treatments (discussed below), affecting the number of buds left after balance pruning.

There was a significant interaction between the shoot tipping treatment and the season ($p = 0.0017$). Yields per vine were 2.7 and 3 kg/vine for the non-tipped and tipped vines in the first season, respectively. These differences were not significant. In the second season, however, non-tipped vines had more shoots and clusters per vine which resulted in higher yields (5.7 and 4.1 kg per vine for non-tipped and tipped vines, respectively).

Across all treatments, total yield per vine was closely related to number of shoots per vine ($r = 0.743$, $p < 0.0001$), number of clusters per shoot ($r = 0.673$,

$p < 0.0001$), and berries per cluster ($r = 0.457$, $p < 0.0001$).

Percent fruit set was inversely related to the number of flowers per inflorescence (Fig. 1). This compensation mechanism is an interesting phenomenon. It seems to indicate that even after the number of clusters and

flowers are determined, fruit set provides an additional opportunity to regulate the crop by adjusting it to available resources.

Fruit composition: Juice-soluble solids concentration was reduced by shoot tipping (Table II). Brix increased, however, with increasing lateral shoot

Portrait of the Artist's Mother (detail) by Albrecht Dürer dated 1514.



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Table II. Effect of canopy manipulations on fruit composition of Pinot Noir grapevines during two consecutive seasons.

	Soluble solids °Brix	Juice pH	Titrateable acidity (g/L)	Skin antho- cyanins (mg/berry)	Skin antho- cyanins (mg/g fruit)
Tipping					
No	22.5	3.23	7.24	0.933	0.791
Yes	21.9	3.19	7.52	0.885	0.757
Significance (p)	<0.0001	0.0192	ns*	ns	ns
Laterals					
Absent	21.7 c*	3.17 b	7.62	0.849 b	0.722 b
Short	22.2 b	3.22 ab	7.30	0.912 ab	0.772 ab
Long	22.7 a	3.24 a	7.21	0.966 a	0.828 a
Significance (p)	<0.0001	0.0045	ns	0.0076	0.0149
Leaf Removal					
No	22.5	3.22	7.50	0.924	0.789
Yes	21.9	3.20	7.26	0.894	0.760
Significance (p)	0.0001	ns	ns	ns	ns
Season					
Year 1	22.8	3.27	7.07	0.938	0.741
Year 2	21.6	3.15	7.69	0.880	0.807
Significance (p)	<0.0001	<0.0001	0.0006	ns	0.0270

* Values followed by the same letters within main factors and columns do not differ significantly; ns: not significant at the 5% level. Interactions between main factors were not significant.

length. These two responses can be explained if the corresponding leaf age distribution and photosynthetic activity of different aged leaves are considered.

Photosynthetic activity is higher in recently formed leaves, with the peak of photosynthesis occurring when leaves attain full size, followed by a gradual decrease with increasing leaf age [1,21,22,33].

Young leaves were present on non-tipped vines and those with lateral shoots. Thus, non-tipped vines or those with lateral shoots should have higher overall canopy photosynthesis, resulting in a larger pool of photoassimilates available for accumulation of sugars in the fruit. Furthermore, it has been shown that the presence of fully expanded young leaves is advantageous for sugar accumulation in the fruit [4].

Removing four basal leaves four weeks after bloom reduced juice solu-

ble solids at harvest (Table II). It has to be noted that under western Oregon climatic conditions, vegetative growth stops relatively early compared to that of winegrape growing regions in central Europe that receive precipitation during the summer months.

In eastern Switzerland, where leaf growth does not stop until veraison, there was no significant decrease in juice soluble solids on vines where all the leaves on the primary shoot had been removed [3]. In that study, lateral shoots were able to reconstruct an adequate assimilating surface and compensate for the absence of main leaves.

In this experiment, basal leaf removal was not compensated for by increased lateral shoot growth. There was no interaction between leaf removal and lateral shoot length treatments for leaf area (Table III). Lower juice soluble solids in response to removal of basal leaves can be explained by reduction of the leaf to

fruit ratio from 15 to 10 cm²/g fruit (Table III).

Growers should guard against excessive fruit exposure due to leaf removal, and they should evaluate this practice for each vineyard using historical data on canopy exposure and previous wine quality [14]. If foliage or fruit already receive adequate exposure, leaf removal may cause a reduction in berry weight and soluble solids, probably because too much leaf area has been removed [2].

There were no significant differences in titratable acidity among treatments, but juice pH responded similarly to juice-soluble solids, indicating that "younger" canopies hasten fruit ripening (Table II). In contrast with our results, it is generally accepted that increased cluster exposure to sunlight decreases juice acid content [15,16,28,31,32,37].

Skin anthocyanin content was not affected by increased exposure result-

ing from leaf removal in the cluster zone (Table II). Reports on the effect of sun exposure on anthocyanin content are inconsistent. Increasing sun exposure of berries did not change anthocyanin content in Pinot Noir [25], but increased the color of Cabernet Franc [10] and Cabernet Sauvignon [7].

The presence of more lateral leaves improved skin anthocyanin content both per berry and per amount of fruit (Table II). Canopies composed only of lateral leaves generate fruit with higher soluble solids and anthocyanin content as compared to non-defoliated controls [4]. Lateral leaves, being the youngest leaves in the canopy, may play a major role in metabolic processes occurring during fruit ripening.

Canopy development and vine vigor: Average leaf size (main and lateral leaves) increased with shoot tip removal but did not respond to other treatments (Table III). It has been

shown that one of the compensation mechanisms for defoliation is the increase in size of the remaining leaves [4]. However, we did not observe this compensation in response to basal leaf removal and lateral shoot shortening.

Removal of shoot tips decreased total leaf area by 47%, primarily because of reduced main leaf area (Table III). Complete removal of lateral shoots decreased total leaf area by 43% and 45% as compared to treatments with trimmed laterals and long laterals, respectively (Table III).

Vines with laterals cut back to four leaves had 20% less lateral leaf area than vines with untrimmed lateral shoots, but there was no significant difference in total leaf area between these treatments. Total leaf area per vine was not significantly reduced by leaf removal in the cluster zone (Table III).

Shoot tip removal increased the proportion of leaf area arising from lateral

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Table III. Effect of canopy manipulations on canopy architecture of Pinot Noir grapevines during the second season of application of the treatments.

	Main leaves size (cm ²)	Lateral leaves size (cm ²)	Main leaf area/vine (m ²)	Lateral leaf area/vine (m ²)	Total leaf area/vine (m ²)	Lateral leaf area percent of total	Leaf:fruit ratio cm ² /g fruit
Tipping							
No	99	31	5.69	2.13	7.82	24	15
Yes	113	38	2.47	1.73	4.18	32	11
Significance (p)	0.0067	0.0103	<0.0001	ns*	<0.0001	0.0049	0.0031
Laterals							
Absent	98	—	4.17	—	3.89 b*	—	9 b
Short	109	33	4.24	2.57	6.81 a	39 b	14 a
Long	112	35	3.80	3.22	7.02 a	46 a	15 a
Significance (P)	ns	ns	ns	<0.0001	0.0019	<0.001	0.0005
Leaf Removal							
No	109	37	4.50	2.19	6.68	29	15
Yes	103	32	3.64	1.68	5.32	28	10
Significance (p)	ns	ns	ns	ns	ns	ns	0.0012

*Values followed by the same letters within main factors and columns do not differ significantly; ns: not significant at the 5% level. Interactions between main factors were not significant.

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shoots but leaf removal in the cluster zone did not change this ratio (Table III).

Shoot diameter during mid-ripening did not respond to shoot tip removal, even though the hedged shoots were 76% shorter (data not shown).

Trunk volume measured in the winter during dormancy was not affected by any treatments (Table IV) but it decreased after the second season. This could not be accounted for with changes in water content (data not shown). The decrease in trunk volume may be the result of increased yields in response to balance pruning in the winter prior to the second season.

The fruit is the primary sink for assimilates during the six weeks after veraison [5]. After that, the roots become the most powerful sink [5]. During ripening and under non-stressing conditions, leaf photosynthesis is the only source of carbohydrates for fruit development [5].

Table IV. Effect of canopy manipulations on vine vigor and Ravaz Index of Pinot Noir grapevines during two consecutive seasons.

	Cane wt (g)	Pruning wt (kg/vine)	Trunk volume (cm ³)	Ravaz Index (kg fruit/kg prunings)
Tipping				
No	61	1.209	2394	4.0
Yes	43	0.678	2254	6.0
Significance (p)	<0.0001	<0.0001	ns*	<0.0001
Laterals				
Absent	46 b*	0.839	2282	5.6 a
Short	53 ab	0.953	2260	5.1 ab
Long	56 ab	1.038	2430	4.3 b
Significance (p)	0.0251	ns	ns	0.0158
Season				
Year 1	58	1.081	2458	3.2
Year 2	46	0.805	2190	6.8
Significance (p)	0.0001	0.0001	0.0004	<0.0001

*Values followed by the same letters within main factors and columns do not differ significantly; ns: not significant at the 5% level.



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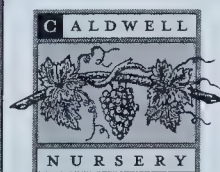
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Table V. Effect of canopy manipulations on trunk carbohydrate reserves of Pinot Noir grapevines during dormancy.

	Starch concentration	Sugar concentration	TNSC concentration	Starch g/trunk	Sugar g/trunk	TNSC g/trunk
Tipping						
No	9.3	3.9 a*	13.2	172.0	71.9 a	244.0
Yes	9.7	3.5 b	13.1	170.4	59.4 b	226.9
Significance (p)	ns*	0.0034	ns	ns	0.0011	ns
Laterals						
Absent	9.0	3.5	12.5	156.0	59.0 b	210.7 b
Short	9.4	3.6	13.1	170.1	64.9 ab	235.0 ab
Long	10.0	4.0	13.9	187.6	73.1 a	260.7 a
Significance (p)	ns	ns	ns	ns	0.0105	0.0186
Season						
Year 1	11.9 a	3.7	15.7 a	225.5 a	69.6 a	292.2 a
Year 2	7.0 b	3.7	10.7 b	117.0 b	61.7 b	178.7 b
Significance (p)	<0.0001	ns	<0.0001	<0.0001	0.0362	<0.0001

*Values followed by the same letters within main factors and columns do not differ significantly; ns: not significant at the 5% level. Interactions between main factors were not significant.



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However, carbon reserves in the trunk and roots can complement current photosynthesis to support fruit maturation in cases of photosynthate shortage [5]. The larger crop load during the second season may have limited replenishment of carbohydrate reserves in the trunk (Table V) and caused the smaller trunk volumes.

Pruning weights were not affected by lateral shoot length (Table IV) or leaf removal (data not shown) but they decreased greatly with shoot tipping (Table IV). Pruning weights and average cane weight were less following the second season, possibly in response to balance pruning (Table IV).

There was a significant interaction between the shoot tipping treatment and the season: shoot tipping decreased cane weights from 73 g to 42 g after the first season and from 49 g to 43 g after the second season. Vines in

balance should have canes between 30 g and 40 g, 40 g being preferred in cool climates (R. E. Smart, personal communication, 1995). Vines without lateral shoots had the lowest cane weights (Table IV).

The Ravaz Index represents the ratio of reproductive to vegetative growth. Balanced vines should remain between 5 and 7 [27]. Shoot tipping increased the Ravaz index from 4 to 6 (Table IV). Trimming or eliminating lateral shoots also increased the Ravaz index (Table IV). Leaf removal did not change this ratio and did not affect cane or pruning weight (data not shown).

The Ravaz Index increased more than two-fold from the first to the second season (Table IV). This is probably a response to balance pruning prior to the second season. This supports the general belief that appropriate pruning levels, matching vine capacity with cropping level, are extremely important in achieving a

balance between vegetative and reproductive growth.

Carbohydrate reserves in the wood: Concentration and total amount of starch in the trunk during dormancy were not significantly affected by any canopy management treatments (Table V). There was a trend, however, toward increased concentration and total amount of starch in response to shoot tipping, lateral shoot length (Table V), and leaf removal (data not shown).

Sugar concentration and total amount per trunk decreased with shoot tipping (Table V). The total amount and concentration of non-structural carbohydrates were not significantly affected by shoot tipping (Table V) or leaf removal (data not shown). Total carbohydrate reserves stored in the trunk increased, however, with lateral shoot length, in agreement with prior research by Candolfi-Vasconcelos [3].



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Starch content in the permanent vine frame was related to juice soluble solids during the preceding season (year 1: $r = 0.326$, $p = 0.011$; year 2: $r = 0.411$, $p = 0.001$), suggesting that sugar accumulation in the fruit and starch accumulation in the reserve organs occur simultaneously. This is in agreement with results reported previously [4,5].

Conclusions

Canopy management techniques used in this experiment were targeted at changing leaf age distribution of the vine canopy at critical times during the growing season. They should be implemented only with full understanding of their impact on carbohydrate translocation patterns and leaf photosynthetic response to aging.

Canopy management practices can be used to maximize the amount of carbohydrates partitioned to inflores-

cences during bloom to improve fruit set or to reduce partitioning to reduce fruit set.

Results obtained in this study indicate that eliminating immature leaves during bloom increases fruit set and promoting vegetative growth during bloom reduces fruit set. Therefore, by manipulating the number of competing sinks for carbohydrates during early stages of berry development, it is possible to increase fruit set in poor set varieties or decrease cluster compactness in varieties prone to bunch rot.

Canopy management can be used to maximize carbohydrate partitioning to fruit during ripening; this can be achieved by actively promoting the availability of young, fully expanded leaves during fruit ripening.

Retaining lateral shoots hastened fruit ripening, improved fruit color, and increased the level of carbohy-

drate reserves in the trunk. This is a valuable technique that can be used to improve fruit composition and vine survival in short-season wine-grape regions.

Removal of leaves in the cluster zone at four weeks post-bloom did not affect yield or yield components, but it decreased juice-soluble solids and did not improve skin anthocyanins. Our experiment was conducted in a moderate vigor vineyard, and removal of three to four leaves in the cluster zone seemed to be excessive. This cultural practice should be reserved for vigorous vineyards with crowded canopies. ■

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The 2001 Best Paper Award for viticulture was awarded by the American Society for Enology & Viticulture to the authors.

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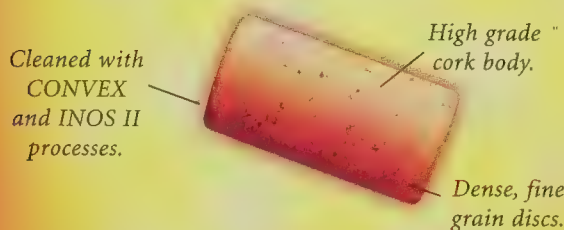
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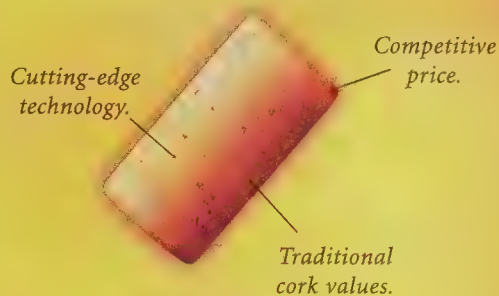
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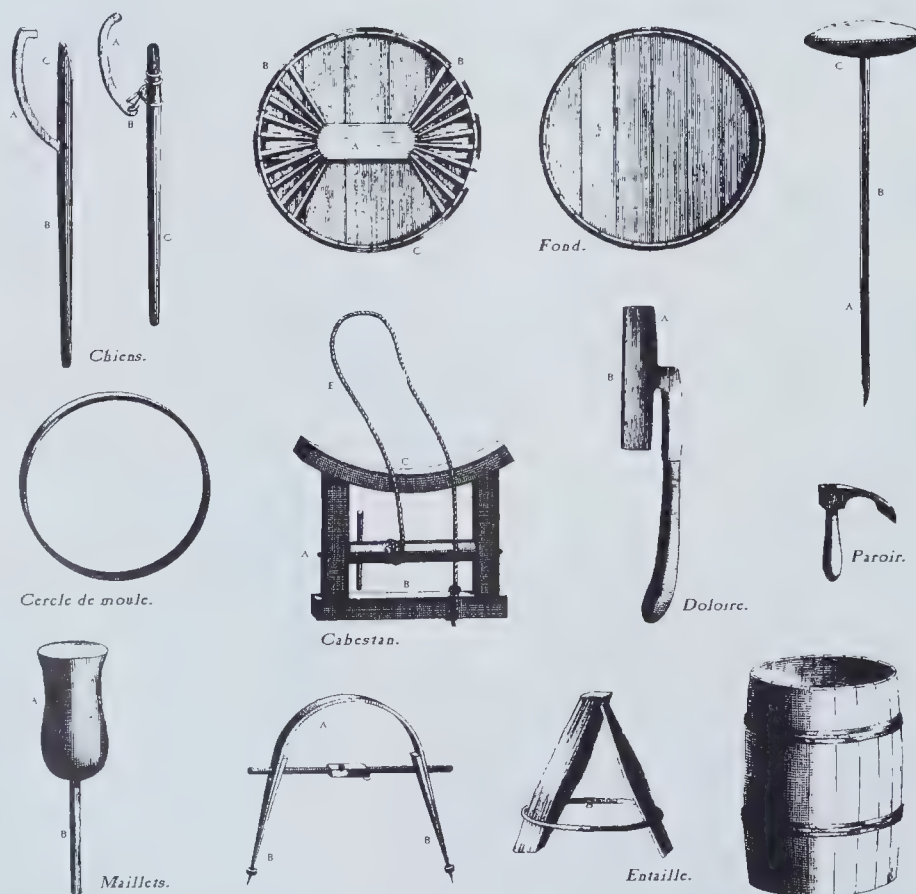
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Continued on page 68

LETTERS

Editor:

I applied the two indices mentioned by Linda Bisson in her "Optimal Grape Maturity" (*PWV*, July/August 2001, p. 32) to two Pinot Noirs cited in Eleanor & Ray Heald's "Crafting Red Wines with Style" (*PWV*, July/August 2001, p. 50).

The two indices were:

- Ripeness Index to measure optimal sugar/acid balance where the product of Brix multiplied by the square of pH should be between 220 and 260.
- Sugar to titratable acidity ratio where Brix divided by TA (in g/100ml) should be 30 to 32.

The two Pinot Noirs, crafted by Steve Reeder of Chateau St. Jean (Kenwood, CA), were:

Durrell Vineyard fruit with 24.9° Brix, 0.91 TA, and 3.46 pH, resulting in a Ripeness Index of 298 (somewhat above the recommended 260), and a Brix/TA ratio of 27.4 (well below the recommended 30).

Sangiacomo Vineyard fruit with 25.0° Brix, 0.80 TA, and 3.55 pH, resulting in a Ripeness Index of 315 (way above the recommended 260), with a Brix/TA ratio of 31.25 (within the recommended range).

A Pinot Noir from my Shiloh Estate research nano-vineyard at 25.8° Brix, 0.82 TA, and 3.765 pH scored a whopping 365 for the Ripeness Index and a within-range 31.5 for the Brix/TA ratio.

Although my wine could be considered modest in quality, I assume that Steve Reeder's two wines were high in quality.

What is one to think?

Reese C. Wilson
Napa, CA

Author responds:

The values given for the sugar:acidity ratio as an index of ripeness were taken from the references cited in the text. My own view of the usefulness of such a ratio is expressed in the paragraph immediately following: "...these kinds of universal rules of thumb may be of little general predictive value — especially if indiscriminantly applied."

What is one to think? Hopefully that I am right in questioning the validity of such "absolutes"! Thank you for your comments.

Linda Bisson,
UC Davis Dept. of Viticulture & Enology

Editor:

It was a pleasure to read the story behind the growing success of Camelot wines in your July/August issue, but one of our partners was inadvertently left out of the story.

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To Readers:

PWV regrets omitting the following references for "In search of

Optimal Grape Maturity" by Linda Bisson, pages 32-43 of *PWV*, July/August 2001.

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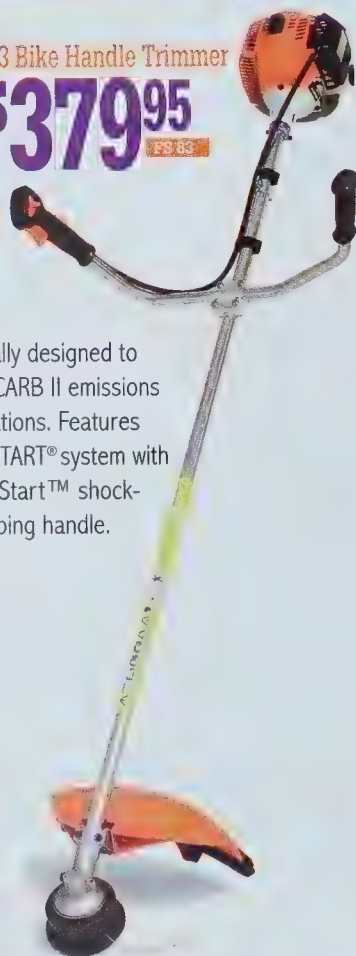
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world, temperatures never get too warm, and the majority of the country enjoys a maritime climate. The country's elongated shape means that no part of New Zealand lies more than 90 miles from a major body



COVER STORY

of water; thus the breezes off the sounds and bays almost always assure moderate temperatures in vineyards.

This is true for Pinot Noir growing districts, such as Martinborough on the North Island and Marlborough, Nelson, and Canterbury on the South Island. One region, however, is dramatically different.

Central Otago, located north and east of Queenstown, has a continental climate, since the vineyards here are sheltered from coastal influence by mountain ranges on each side. Located at the 45th parallel on the South Island, this is the southernmost wine region in the world.

Temperatures in Otago are quite cool, giving the region's Pinot Noirs great intensity. While comparisons to Burgundy are inevitable (it does rain intermittently throughout the growing season), the wines here bear little resemblance to those of the Côte d'Or. They are riper with more black fruit character than their counterparts from France.

Statistics reveal how serious New Zealand vintners have become about Pinot Noir. In 1996, 1,056 acres were planted to Pinot Noir. By 2000, that figure had grown to 2,759, making it third in total acreage behind Chardonnay and Sauvignon Blanc. By 2003, the predicted plantings for Pinot Noir will be 5,115 acres, or 15.3% of all varietals.

Success in Martinborough

The finest Pinot Noirs have been produced in the Martinborough region. Located in the southern portion of North Island, Martinborough is northeast of the capital city of Wellington. Three estates have made the most remarkable advances here: Dry River, Ata Rangi, and Martinborough Vineyards.

While these wines bear the handprint of individual vintners (Dr. Neil McCallum, a chemist with perfectionistic work habits, makes deeply concentrated Pinot Noirs at Dry River), there is a stylistic thread here of wines

that display ripe fruit along with an earthy, slightly meaty character.

Another vintner who has been a leading force with Martinborough Pinot Noir is Larry McKenna. More than anyone else, McKenna has brought a high level of quality — and respect — to New Zealand Pinot Noir with his work at Martinborough Vineyard.

McKenna left this winery after the 1999 harvest and is now busy with his new Escarpment Vineyard, just east of the town of Martinborough. McKenna has planted 50 acres to five varietals, some 40 of those to Pinot Noir. The first harvest will be in 2002. McKenna harvested Pinot Noir in 2001 from a nearby vineyard that is 12 years old.

The eastern boundary of the Escarpment Vineyard is a severe east-facing hillside (McKenna is not sure of the slope, estimating it as 45°), hence giving the property's name. The vine rows run north-south. Soils are alluvial loams over alluvial gravels, similar to the vineyards he worked with previ-

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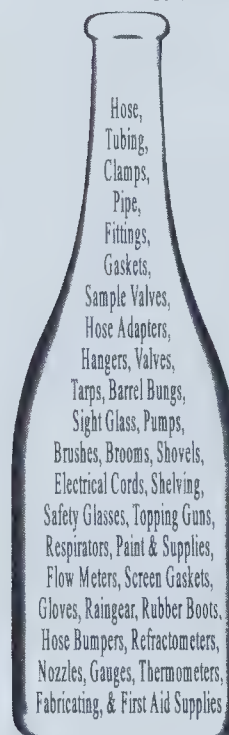
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ously in the district. Compared to the sites he worked with at Martinborough Vineyards, temperatures are marginally cooler in winter and warmer in summer, so grapes may be picked later, but otherwise conditions are similar.

McKenna has planted spacing trials with a small area of own-rooted Pinot Noir at 1.5 x 1.0 meters (2,693 vines per acre), while 70% of the plantings are 2.0 x 1.5 meters (1,346 vines per acre). Using a very low fruiting wire set at 15 inches in the close-planted block and 20 inches in the wider-spaced block, McKenna will try to get the most benefit of reflected heat from the soil. He believes he will get riper flavors in the grapes.

McKenna is looking for more soil influence, more roots per hectare. "We talk a lot about leaves per hectare and the number of shoots and the number of buds per hectare, and that obviously relates to roots per hectare. I think the important thing is to concentrate on what's above and below ground. The more vines we plant, the more roots we'll have per

hectare, and I think we might have wines with more *terroir*, more character."

Own-rooted vines are being planted by McKenna largely for economic reasons. Own-rooted cuttings are \$.50 each compared to \$5.50 for a grafted vine. He couldn't afford to plant a close-spaced vineyard on grafted stock. "Besides," says McKenna. "We have to get on the job. We're trying to get some production as quickly as possible, so we couldn't wait for the grafting. (Other vintners report the wait is as long as 18 months for grafted cuttings from the country's premier nursery on the North Island.)

McKenna admits there could be a problem with phylloxera in the future, but he would "look at that when it happens." Phylloxera has never affected Martinborough, nor much of New Zealand, for that matter. The only areas that have reported infections have been vineyards outside Auckland, in Hawke's Bay on North Island, and a few scattered vineyards in Marlborough on

South Island (all have been replanted). Since New Zealand is so far from other countries, very little machinery is brought in, so vintners worry only about foreigners tramping in vineyard dust and mud on their shoes.

McKenna will be using a number of Dijon clones, both the older selections — 113, 114 and 115 — as well as the newer material — 667 and 777. The latter two will be the predominant clones, while there will also be a small amount of Pommard Clone 5.

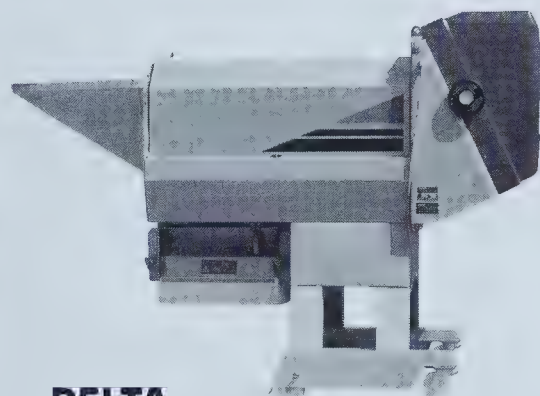
Changes in Marlborough

The Marlborough region, so identified with Sauvignon Blanc, has recently begun to focus on Pinot Noir also. More and more, local vintners are moving away from thinking of Pinot Noir as a sparkling wine grape, shifting their emphasis to table wines.

At Huia Vineyards, Claire Allan and her husband Mike grow Pinot Noir to produce both a sparkling and table

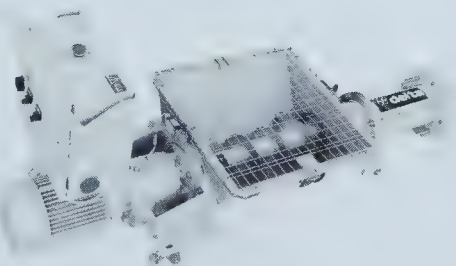
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wine. Their Pinot Noir vineyard is on flat river terraces, with vine rows running south to north. Vertical Shoot Positioning (VSP) is the preferred trellising for Pinot Noir. There are two different types of soil here — clay and gravelly — and Claire notices a big difference in the resulting wines.

"The stony vineyards seem to lift the nose," she states. "There is a slightly angular palate, but with good tannins and length. The fruit we harvest from the clay is not quite so aromatic, but there is good palate weight without such firm tannins on the finish."

The 1999 Huia Pinot Noir is the second commercial release for the winery. The blend has 65% fruit from gravelly loam. The cuvée for the 2000 release will be around 35% fruit from the gravel, which is the style of Pinot Noir Huia is working towards.

She emphasizes the need for the gravel fruit to be a small part of the blend. "We have not yet settled on a final balance — 10%, 20%, 30% — but we do believe grapes from gravel soils provide some structure and grapes from clay soils give weight on the palate."

For the Huia sparkling wine, Allan prefers Pinot Noir from the gravelly soils. "It's fantastic with the stones, because it has a linear structure; it's not so big. We don't take Pinot for sparkling off the clay; it's got too much body for the style we make, whereas off the stones, it's great. It seems to be possible to make both table Pinot Noir and sparkling within Marlborough, but the wines will reflect different sites and clones."

Allan has planted eight different clones of Pinot Noir — Dijon 113, 114, 115, 667, 777, and 375, along with Pommard 5 and 6. She has noticed big differences in 667, as it has behaved totally differently each year. In 1999, the first year she used this clone in the blend, the berries were big — even bigger than GM 10/5 — and ripening was slow and very uneven. After picking it, she kept this wine in a puncheon, noting it was "pink in color." Then, she recalls, "It developed into a really fragrant, silky wine."

However, in 2000, clone 667 set tiny berries and ripened first. From the same block, the clusters were entirely different in size and color. Allan noted this change in clonal behavior when she visited Burgundy and will keep it in mind while monitoring the Huia vineyards.

Making Pinot Noir simply

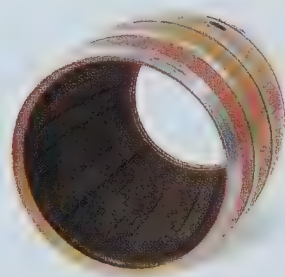
At nearby Seresin Estate, wine-maker Brian Bicknell works with several Dijon and Pommard clones, and an old standby, 10/5 (referred to as "10 bar 5"), a Swiss clone that had been the dominant clone in New Zealand until new French material arrived. Bicknell likes it, since it comes in with slightly higher acid than the Dijon clones. While not as full in the middle of the palate, it does lengthen the finish of the wine, adding good structure.



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NOTES
DIARY/IDEAS

SUBJECT

Premium Wineries

Five stories. ONE bank.

CHAPTER ONE. We All Start Somewhere.

Santa Barbara County. 1975. Trading weeks of labor for a few precious hours on borrowed equipment, Bob Lindquist dreams of having a winery he can call his own. Starting with just \$35,000, he turns (con't at www.svb.com/qupe)

Their first vintage is a smash in Sweden. After quickly selling 4,000 cases, the alcohol monopoly Vin & Spritcentralen orders 12,000 more. Hedges Cellars expands into other markets, finding success wherever they go. The only question now is (con't at www.svb.com/hedges)

The view is breathtaking. Standing on top of a hill overlooking the lush Sonoma valley, Sam and Vicki Sebastiani raise their glasses for a toast, admiring the land on which they will build their dream. It might not be Tuscany, but (con't at www.svb.com/viansa)

Sometimes family legacies are so deeply engrained, they are fulfilled subconsciously, almost without effort. Fate has a funny way of doing that to people. Take Koerner Rombauer. A pilot from (con't at www.svb.com/rombauer)

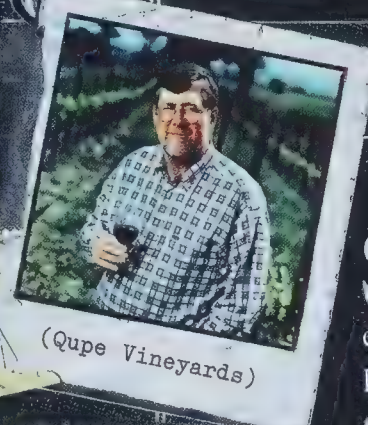
Lexington, Kentucky is a long, long way from the Willamette valley. But for Ken Wright, that's where it all begins. Waiting tables at the quaint Fig Tree restaurant, he develops an insatiable curiosity for wine. One that will lead him from the bluegrass (con't at www.svb.com/wright)

CHAPTER TWO. The Journey Continues. (on the web sites above.)



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This clone along with Dijon 115 has formed the base of the Seresin Pinot Noirs, with 115 adding fleshiness in the middle of the wine.

Bicknell works with a combination of clay and gravel soils and uses VSP trellising in his vineyards, which are planted north-south for as even ripening on both sides as possible. He experiments with several different spacing trials, from 3.0 x 1.8 meters (775 vines per acre) to a very narrow spacing of 2.0 x 0.9 meters (2,267 vines per acre). Bicknell has been happiest with the results from 2.0 x 1.5 meters spacing (1,360 vines per acre) and will be using that in future plantings. There is drip irrigation, which is used only when required.

Bicknell believes he could not make Pinot Noir any more simply. All the fruit is handpicked and then sorted. The fruit is destemmed — there is no crushing — and goes through five days of cold soak. After the fruit warms up, it goes through a 100% indigenous fermentation. As soon as that starts, Bicknell plunges the

cap and after fermentation (peak of 91°F), takes the wine direct to barrel.

Malolactic fermentation occurs in the barrel, and Bicknell notes that he stirs the wine just a bit, as it is sitting on heavy lees. He leaves it in oak for 15 months, and if necessary, he will fine with egg whites and then bottle the wine unfiltered.

Bicknell believes the only way to make Pinot Noir more easily would be not to destem, but he concludes that, with the cooler temperatures in Marlborough, the stems don't get fully ripe. He finds that with a low yield of two tons or less per acre and quality sunshine, he gets very good fruit tannin.

Most New Zealand winemakers report that the pH level in Pinot Noir shoots up after primary fermentation. To counteract that, they usually make an acid addition. Bicknell has the same results, but is very sensitive when it comes to adding acid. "In Australia and New Zealand, we're very concerned with this technical correction. Some winemakers are getting to 3.4

and they're adding three grams of acid. For me, that's too much."

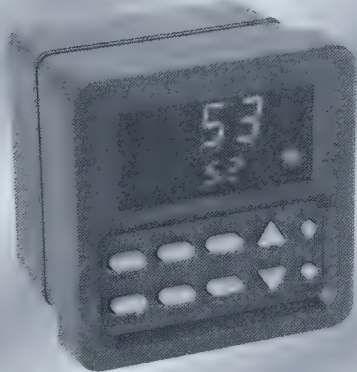
Bicknell believes that by keeping the yield low and the canopy very open, he is able to achieve a lower pH level. He concludes, "We could be picking at 3.3 pH and it does zap up a bit, but we're quite comfortable with the finished wine being 3.6 or 3.65, with around six grams of acid."

In his first two Pinot Noir vintages (1997 and 1998), he added no acid, while in 1999, he added 0.5 gram. His opinion is that, with the tannin structure, he can live with slightly higher pHs. While the wines may be a bit tight in their youth, Bicknell believes they will be just fine in their mid-life. Most important, acid will not be sticking out as the fruit drops off.

Fine tuning at Grove Mill

Near Seresin is Grove Mill Vineyard, where David Pearce has been a quick study in Pinot Noir. He admits his first three efforts with the grape —

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1994–1996 — were “awful.” He persevered and finally settled on a clonal mixture of 85% Pommard-5 with 15% 10/5 for his latest release.

Pearce is not a fan of lighter Pinot Noirs, so he makes his wines for those who favor bigger reds. The colors are deeper and the flavor profiles a little bit darker and meatier, especially in his 2000 release. His chosen clones dictate that style; he likes the robustness of the Pommard-5 as well as the tannin structure and earthiness. The 10/5 gives the wine a big beet root, parsnip character.

While flavors from the 10/5 add an appealing complexity, Pearce does not want them to dominate, so he does not leave the juice from the grapes on the skins very long. He runs off the juice at 8° Brix, barrel ferments it and keeps it separate all the way through malolactic in barrel. The remainder of the tank is pressed off, even though it is not dry, and is put back over the skins of another fermentor. It is then macerated past dryness, which is where much of the meaty, almost gamey character that Pearce loves comes from.

For the 1999 vintage, Pearce produced 500 cases of Pinot Noir. Projections call for almost 6,000 cases by 2005. New plantings in the Wairau River Valley east of the major Marlborough vineyards will soon come online, and Pearce will start to work with eight more new clones. These new clones along with 10/5 will make up 60% of the blend in future Grove Mill Pinot Noirs, with the 40% Pommard. His hope is that the new material will sweeten the middle of the wine without losing the structure he wants.

Canterbury terroir

Further south, Canterbury is one of the pioneer Pinot Noir growing regions in the country. The most distinctive wines come from the Waipara district, some 40 minutes north of Christchurch. Several factors make this area ideal for Pinot Noir, according to Matthew Donaldson, co-winemaker with Lynnette Hudson at Pegasus Bay.

Donaldson explains that the Waipara Valley is separated from the coast by a series of hills to the east, and is thus not affected by cooling breezes off the sea. This means that Waipara is slightly warmer than Christchurch and can ripen Pinot Noir beautifully.

This is one of the country's driest regions particularly in the autumn, so

rain is rarely a problem at harvest time. Donaldson also notes that the big diurnal fluctuations are ideal for retaining the good acidity so necessary for Pinot Noir.

Pegasus Bay has 15 acres of Pinot Noir currently in production, with another 10 acres to come online in 2002. These are largely deep, free-draining alluvial gravels that Donaldson crops low, between two to three tons per acre. The 10/5 has been his clone of choice, representing almost 90% of the plantings. In 2001, the Pommard clones 5 and 6 began producing while five new Dijon clones will be part of the mix in 2002.

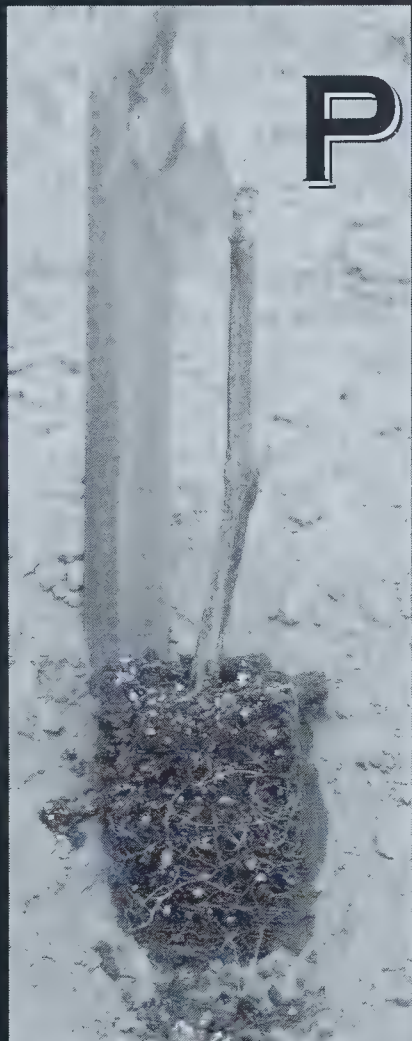
Donaldson's Pinot Noirs are a delicate balance of sweet, ripe fruit, subtle spice, and ample tannins. His best effort here is the Prima Donna Pinot Noir, an appropriate name given the fickle nature of the grape. He remarks that while Canterbury Pinot Noirs tend to have a “very perfumed and elegant style with cherry fruit flavors, fine tannins, and good acidity,” the Waipara

examples “are more full bodied with plum, chocolate, and spice flavors, bigger tannins yet good acidity.”

Comparing these wines with other regions, Donaldson states that Marlborough Pinot Noirs generally show ripe soft berry aromas, are full bodied, and can develop complex, gamey complexities with time. He believes Marlborough wines are a “tighter, more focused style of Pinot Noir with vibrant cherry flavors and good tannins to balance.”

Central Otago — Future of New Zealand Pinot Noir?

The region with the potential to produce the best Pinot Noirs in New Zealand is Central Otago. Vintners here are focused on the varietal, with 48.8% of their plantings in Pinot Noir. This is not only the highest percentage for Pinot Noir in any region, it is also the highest of one variety in any region, surpassing Sauvignon Blanc in Marlborough and Chardonnay in Gisborne. By 2003, the percentage of



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Pinot Noir plantings will be at 61% of the total in Central Otago.

As described above, the climate here is ideally suited to the varietal. Recent efforts from Felton Road, Quartz Reef, and Chard Farm have displayed the sweet black cherry fruit and spice this region is becoming known for.

There are several different growing districts in Central Otago, the two best-known being Gibbston Valley and the Cromwell Basin. As a whole,

Central Otago is the driest region in New Zealand (14 to 18 inches of rainfall annually), and the Cromwell Basin is the drier and warmer of the two areas.

Rudi Bauer, who makes Pinot Noirs in both districts (Quartz Reef from Cromwell, and Peregrine from Gibbston Valley), describes differences in the wines. Cromwell Basin wines offer fruit flavors of plum and the blue and red berry spectrum, while having

slightly lower acidity and moderate tannins.

Bauer believes wines from Gibbston Valley have a "more exciting flavor profile," if full physiological ripeness is achieved. In his view, these wines are characterized by dark tones of blueberry and black currant fruit with higher acidity and tannins that he portrays as "sturdy and solid."

Bauer sees a developing trend of distinctive sub-regional flavors in



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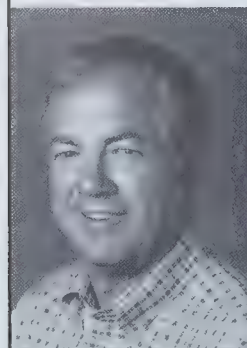
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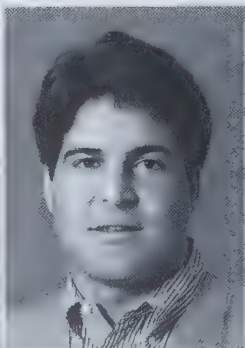
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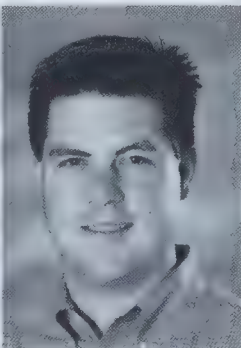
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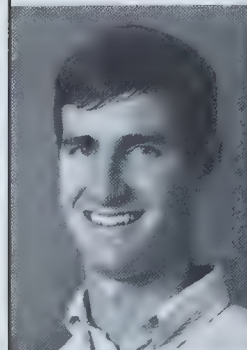


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Central Otago. He believes it is important for the area's vintners to highlight that trend, as French vintners do in the Côte d'Or. He admits, however, that it will take at least "another five to 10 years" for sub-regional characters to become discernible.

Felton Road Winery in the Cromwell Basin has become a respected producer of New Zealand Pinot Noir since its first wines from the 1997 vintage. One bottling, Block 3 is among the country's most sought after.

The winery has 25 acres in production, of which 40% are Pinot Noir. The soils are largely river and glacial deposited gravels, although winemaker Blair Walter believes most of the soils are more like clay, since they hold more moisture. This factor, combined with small amounts of rain throughout the growing season, leads Walter to believe that irrigation may not be necessary in most years.

Row orientation is primarily north-south. A few rows run northeast to southwest (Block 3 is north-south, which is what Walter prefers). Spacing is 2.5 x 1.5 meters (1,088 vines per acre), which Walter reports is working fine. He would however, like to see tighter spacing of 2,000 vines per acre, as this vigor would encourage smaller bunches and berries. He will plant a 1.2-acre block of very high density behind the winery. No such density currently exists in Central Otago.

Like most plantings in the region, the vines are self-rooted. Only 25% of the vines at Felton Road are grafted, close to the 22% figure for Central Otago. Walter notes that when these vineyards were planted in 1992, no one knew what rootstocks would work here. The vines on rootstock are helping Walter learn what is most appropriate for the soils, and future plantings will be with grafted roots. Block 3 is on its own roots.

Pommard 5 and Wadenswil 10/5 are the predominant clones here, and there is a small amount of UCD 6 as well (Block 3 is entirely Wadenswil 10/5). Walter crops between two and three tons per acre, and always hand-harvests very ripe fruit. (Most New Zealand vineyards are machine-harvested, due to lack of a large labor force.)

"There is normally a very long hang-time before harvest," notes Walter. "Sugars accumulate so fast, that to get the flavor maturity and seed maturity we have to wait until we get 24° or 25° Brix." He constantly tastes the grapes, trying to pick before the sugars get too high.

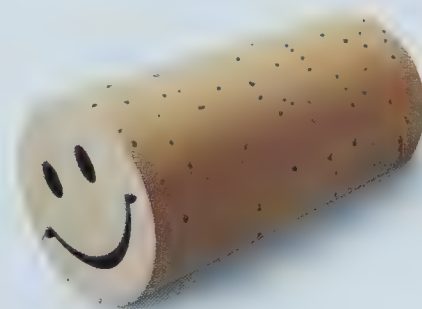
Walter designed a gravity flow winery to treat the fruit as gently as possible. There is no must pumping, no crushing, so a large percentage — as much as 70% — of whole berries go in the fermentor that is located outside. While Walter tries to let the native yeasts start the fermentation, he sometimes needs to add

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yeast to the first lots. (The white wines start up by themselves, but they are pumped into the winery.)

After a primary fermentation that peaks at 91°F, there is post-ferment maceration (between five and nine days). This is how Walter gets the tannin maturity he seeks. "I find that if I press early, I get those simple one-dimensional tannins. I'm not getting the complexity in the wine that I prefer," he states. The wines are bottled the following March without fining or filtration and released in May, to generate cash flow for the new winery.

Regarding pH, Walter believes that too many New Zealand vintners add too much acid to the Pinot Noirs. "They're paranoid of having a higher pH wine, so they're adding acid to achieve a lower pH, but at the expense of the mouthfeel of the wine." Walter believes these winemakers are looking at a desired number for pH in their wines instead of a preferred harmony on the palate.

Yet, saying that, Walter admits he does have the problem of the pH level in his Pinot Noirs rising quite high after fermentation, so he does add some acid. Walter believes adding acid is a necessity, but other vintners are adding too much. This is due to a potassium shift that has Walter puzzled. "It's something we're working on in our vineyard to find out why we're getting these shifts. We are harvesting at good pH — 3.2 to 3.3 — but we're finding in the fermentor, it will go up immediately to 3.6. If we didn't do anything about that, after malolactic fermentation, the wines would be 3.8 or 3.85."

Walter knows that these high pH readings would interfere with the wine's ageability. "The wines would be so much more prone to oxidizing faster and to microbial spoilage. That's why many people add acid, but you have to be careful on this and still respect the mouthfeel of the wine. There's nothing worse than drinking an acidic Pinot Noir."

What lies ahead

Given that the oldest Pinot Noir vineyards in New Zealand were planted in the mid-1980s, the vintners have come a long way with this varietal in a short time. What does the future hold for these wines?

Walter: "We need more vine age before we can say to people, 'Hang on to them for a few years.'"

Donaldson: "As our vines get older and we get more complexity from the fruit, hopefully things can only get better. Also, we will probably see more single vineyard designation."

Finally, a few thoughts from Bicknell: "There is still a lot of work to be done. We need to crop low and hand-pick. There needs to be a greater focus. It's easy to do, but it's a totally different mindset. Sauvignon Blanc has been made where it's in and out of the winery very quickly, but there are some that aren't made that way. You need to take those extra steps with Pinot Noir."

GORDON GRAPHICS: LABEL ANALYSIS

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BY Eleanor & Ray Heald
Contributing editors

Winemakers in the U.S. have only a few international role models for production of varietal Marsanne. In the northern Rhône Valley of France, Marsanne is the principal grape variety in White Hermitage, and it performs solo in the white wines of the St.-Joseph, St.-Péray, and Crozes-Hermitage appellations.

Once disregarded in the northern Rhône as a low-acid variety that required a blending partner such as the higher-acid Roussanne or Viognier, Marsanne has gained popularity under modern winemaking methods that control its tendency to produce flabby wines.

Some of the world's oldest Marsanne plantings are found in Australia's state of Victoria, where they produce a generous, long-lived white wine. In the Valais region of Switzerland, it is called Ermitage Blanc, a wine style lighter than either White Hermitage from the northern Rhône or Marsanne from Victoria.

With few international forebears, U.S. wineries producing Marsanne are considered pioneers. Their wine will not shake the crown held by Chardonnay as the most popular white wine in the U.S., but with some consumers, it's becoming an attractive alternative.

In the marketplace, Bonterra presents Marsanne in a Rhône wine setting, along with the Viognier and Roussanne, which it also produces. "In volume, Viognier is more important," notes Bob Blue (Bonterra). "For us right now, Marsanne is fun and experi-

mental — something new to introduce to consumers."

In his wine line, Buck Cobb (Karly) replaced Chardonnay, sourced outside the winery's Amador County location, with Marsanne, more suited to the warmer region of the estate vineyards in Shenandoah Valley at 1,440 feet elevation.

Beckmen Vineyards' focus is shifting toward Rhône varieties, with Marsanne phasing out Chardonnay. "Marsanne has created a lot of fans," Steve Beckmen says. "It has been exciting to see it so well received in the market. I present it as a Rhône varietal only to give people an idea of its origin. We've had significant sales in the northeast, in particular Boston and Maine seafood restaurants."

Horton Vineyards in Virginia has a small Rhône program, but the only one on the east coast. Among the white Rhône, Horton has both Viognier and Marsanne. "We educate in the tasting room," Dennis Horton explains, "by saying that if a person has tasted a white St.-Joseph from the northern Rhône, they've tasted Marsanne. Additionally, we've had significant sales in Manhattan restaurants."

Growing Marsanne

All producers interviewed indicate that they are growing Marsanne in loamy-type soil, either sand or clay. That's where the similarity among various producers begins and ends.

Bonterra's source is Lakeview Vineyard in Hopland. The cover crop in tractor rows along east-west oriented vine rows is a Leballister Insect Habitat that includes crimson clover, fescue poppy, baby's breath, allysum, mixed legumes, and poppies. Five-year-old vines on AXR-1 rootstock were T-budded from Cinsaut.

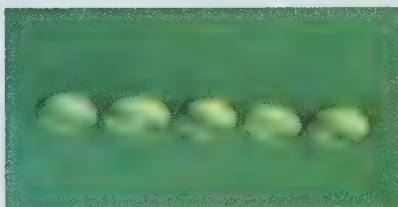
Vines, irrigated with 15 to 20 gallons/week, are cordon-pruned to two-bud spurs on a standard California two-wire trellis (sprawl). Vine management consists of leaf pulling, shoot positioning, and dropping crop as needed to ensure ripening of a 15 lbs/vine crop load.

At Cline, Marsanne is grown on the winery's ranch in the Los Carneros AVA of Sonoma County. Due to poor

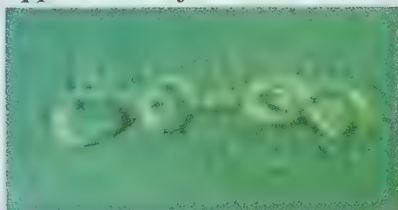
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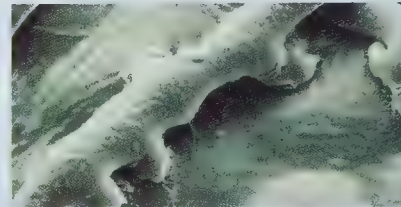
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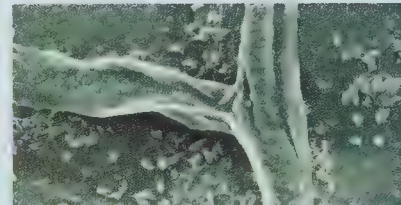
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soil types, amendments of gypsum to change soil pH have helped to ease vineyard stress.

An irrigation regime is managed by inspecting the soil and visual clues offered by the vines. Eleven-year-old vines of Bonny Doon clonal source are in east-west rows on 110R rootstock in gravelly loam, and SO4 in clay loam.

Average yield on vertical shoot-positioned vines is 12 lbs/vine. Moveable wires, judicious water management, and leaf pulling are standard canopy management techniques.

Horton grows Marsanne in Orange County, VA, producing about 1,100 cases annually. He notes that Marsanne is the only acreage that has not suffered Crown Gall or winter damage. Overall, he finds it an extremely durable vine.

Vines on 3309 rootstock planted north-south average 11 years. Native

fescue (K31) is the cover crop. Irrigation at one inch per week during the growing season is terminated post veraison.

Vines are spur-pruned on an open lyre. Shoot positioning, hedging, leaf pulling, and dropping excess crop are management techniques for average yields of 44 lbs/vine (8.5 to 10 TPA). "If we don't promote large yields, the canopy gets so large that fruitful buds are not produced for the following year," Horton contends.

"As an experiment one year, we pruned one row to 3.5 TPA, and the following year, yield dropped to 2.5 TPA. The vine must be balanced. We have a rot problem, and before harvest, we drop a percentage of the crop lost to rot, but not nearly as much as we do for Chardonnay.

"We prefer to grow Marsanne on a wire. The canopy is large and when it's spur-pruned, it grows even larger. If we keep enough fruit on the lyre sys-

tem, we need to hedge only once during the growing season."

In 1994, Karly T-budded Marsanne to Sauvignon Blanc vines on AXR-1 rootstock. A natural cover crop is used in tractor rows between east-west vine rows. Shoot thinning is the only canopy management employed on a Davis Y divided cordon. Vines are not irrigated before veraison and after veraison only if necessary to avoid vine wilting. Average yield is in excess of 30 lbs per vine. Karly's new experimental Marsanne planting in Amador will be head-pruned and grown like dry-farmed Zinfandel.

Beckmen grows Marsanne in the Ballard Canyon area of Santa Ynez Valley. A barley cover crop is seeded between vine rows. Five-year-old vines oriented north-south are Davis clonal selection on 3309 (flatter land) or 5C on hillside blocks.

Drip-irrigated vines, bilateral cordon-trained on a vertical trellis, yield



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VARIETAL REVIEW

seven lbs/vine. The canopy is managed by leaf pulling on both sides of the vine, shoot and cluster thinning, along with shoot positioning.

"We don't experience the level of vigor that Karly and Horton describe," explains Beckmen. "With early thinning after bloom, we shoot for three tons per acre (TPA) by farming at 12 clusters per vine or 1.6 to 1.7 clusters per pound on 10x5 spacing."

Horton is amazed and says, "I don't know what we'd do with this variety if we left 12 clusters per vine. At harvest, we usually take three to four lugs (approximately 90 lbs) off each vine. A single cluster can weigh 2.5 lbs."

At McDowell, vines on 110R and 3309 rootstock average eight years old. East-west oriented rows have a three-legume plow-down cover crop in alternating tractor rows. Vertical shoot positioning and basal leaf removal are standard canopy man-

agement for cordon-pruned vines on a vertical trellis.

Deficit irrigation management is practiced from bloom until veraison, then only minor drip for 30 to 45 days prior to harvest. Yields under this vineyard management are four TPA. "Our vineyard is far enough north to make Marsanne the last white variety picked," Bill Crawford (McDowell Valley) notes.

Harvest parameters

Because Marsanne clusters are so large, Beckmen is striving to attain more even ripening. As ripening progresses, he says, it is possible to have berries on the front of the cluster that are 6° to 8° Brix higher than the back side. Nearly radical leaf pulling is insufficient.

"The backside will have greener berries," Horton agrees. "But we actually push the harvest date until the front berries have a brown hue with

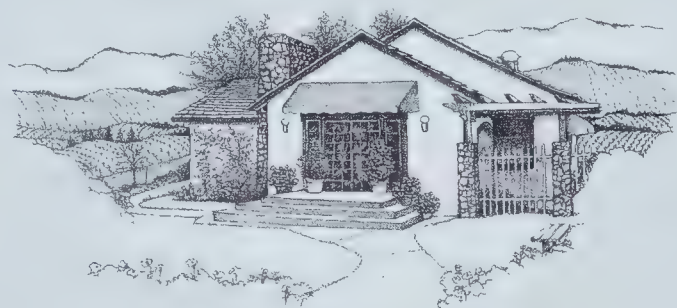
brown spots, where clusters have been exposed to sunlight. We shoot for 20° to 21° Brix. If we push harder than that, the pH rises. We strive for a balance between chaptalization and acidulation."

Judging based on berry color and flavors, Cline says sugar levels at harvest average 22.5° to 23° Brix. "At 23.5° Brix it's overripe," he observes. "Acid has dropped and berries are brown, creating a wine that is too yellow."

Crawford maintains that he needs to wait till a minimum of 23° Brix for even cluster ripening. He is unconcerned in most years about acid levels because the bottled wine includes up to 25% Roussanne.

Beckmen picks Marsanne at 24° Brix and as high as 24.5° Brix. Alcohols rise to the high 13s, yet do not show heat in the finished wine. "We can wait on Marsanne a long time, and it can be the last white grape

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that we pick," he says. "However, since clusters are big and tight, they are subject to rot. Care must be taken if there is rain in October."

Blue maintains that he's picking riper up to 23.5° Brix, but at 24° Brix, he believes it best to dealcoholize the wine to avoid a hot finish.

Pressing and Fermentation

When grapes enter the winery, Horton immediately refrigerates them to 38°F, then presses whole clusters the following day. "Marsanne is a very phenolic grape," he says. "We have found that chilling before pressing reduces phenols about 50%."

Karly is unconcerned if harvest of Marsanne is 24° Brix or higher. Berries are golden and have brown specks. A skin contact time of 20 to 24 hours is allowed before pressing. "We are unafraid of phenolics or brown color," Cobb reports. "The most popular vintage we've made is an overblown style.

"In a warm year, we are on the bubble for acid levels and pH, but I listen to Jean-Louis Chave. When someone comments that his Marsanne has a high pH, he says, 'So? Do you like the wine?' This seemed wise to me, and I've adopted his philosophy."

Cline presses whole clusters for all white varieties. Because he is trying to lighten both the color and structure of Marsanne, he has begun to employ pre-fermentation micro-oxidation of the juice. "I'm still struggling with how much time juice should be settled under O₂," he reports.

Some winemakers who use SO₂ (average 30ppm) say they do so to gain extract from the skins and also as an aid to drop some of the color. "That's not my reason," Cline says. "Marsanne in Carneros is susceptible to powdery mildew, and I want to knock its effects down as much as possible."

Even if fruit is clean, the pH of Marsanne is high. Some winemakers

prefer to use SO₂ to reduce the potential of lactobacillus development.

At Horton, juice at 38°F goes to tank after pressing. Bentonite is added and the juice is racked the next day to a tank for yeast inoculation, then to neutral barrels (at about 40° to 45°F) for fermentation.

Overall, Blue views Marsanne in the context of Viognier and Roussanne, which are also produced at Bonterra. "Since the three varieties are available to us, the question of why we don't blend has been posed," he notes. "For now, I am trying to make each varietal stand on its own and learn more about the qualities of the wine and how they evolve."

"We currently produce only 350 cases, so we ferment Marsanne in older barrels because it's the only way I can do it. Particularly when compared to Viognier, Marsanne juice is the most subtle of the three white Rhône varieties. Using newer oak would detract

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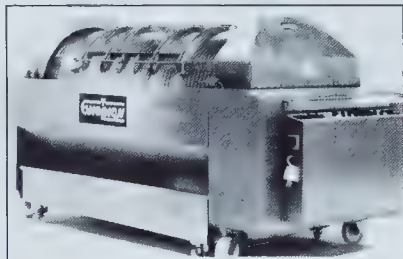
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VARIETAL REVIEW

from its delicate fruit. Because Marsanne is a low acid variety, I prefer to correct the acid to achieve a balance between acid and pH.

"Before fermentation, I bump acid levels to a TA of 0.64 to 0.65. Initial pH is about 3.6 and drops to 3.3 with a tartaric acid addition. Because I make varietal Viognier, which is much bigger and stronger in varietal aromas, as a style model I compare Marsanne to Pinot Grigio more than Viognier."

"But it's all done by taste, not by numbers," Beckmen notes. "It's all a matter of balance. Each year it's a little different."

A regime similar to Beckmen's is practiced at Cline, but Matt Cline often raises the TA to between 0.65 and 0.70, because he believes that white wine with a lower pH (3.3 to 3.4) has a better fruit expression.

At McDowell, dryness is achieved in tank, and wine transfer to barrel is made before malolactic fermentation (MLF).

When MLF is half complete after approximately six to eight weeks in a cold cellar, the wine is transferred out of barrel back to a tank. This is a style decision.

"We pick fairly ripe, and I don't get worried about higher pH," Crawford maintains. "I prefer to acidulate from 0.62 TA to 0.65 (with tartaric or ascorbic acid to bind the precursors of pink) at the crusher."

Only Beckmen uses a totally stainless steel regimen in producing Marsanne. Other producers begin fermentation in tank and transfer to principally older, neutral 60-gallon barrels between 10° and 18° Brix.

Beckmen has noticed that Marsanne juice with a high percentage of solids does not ferment well. An undesirable earthy, creamed corn character develops, he believes. Though he has not measured the percentage of solids, the cleaner he can get the juice, the prettier and better the wine. Some of these winemakers routinely add bentonite to

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settle the juice. Yet Karly Marsanne juice clarifies naturally quite well.

Cline also suggests the use of enzymes to clarify juice. He employs a mid-fermentation racking to another tank at about 14° Brix. Once fermentation completes, the tank is topped and wine is left on lighter yeast lees for about 2.5 to 3 months before it is racked and sulfited.

Yeast choices

In an attempt to elevate aromatics, Horton experimented with VL-1, and he is satisfied that this yeast did what it was touted to do.

Beckmen has also used VL-1, but finds GRE more interesting for Marsanne, offering elevated aromatics and better forepalate body. He notes that VL-1 did enhance aromas, but did not create a better mouth entry impression.

Cline has not settled on a preferred yeast culture. He uses PDM, V-116, and DV-10 with various lots.

"For years, I have used nearly every designer yeast that has come along," Cobb reports. "But after six months to a year in bottle, I've found that the yeast culture made no difference. Now, I pick the yeast that works well and gets the job done cleanly with low foam."

Given the advantage of large tonnage, such as that at Cline, Beckmen believes it is wise to ferment each lot with a different yeast. "When the wine is blended, there are a variety of subtle nuances and complexities achieved by the various yeast cultures. They do continue to be perceived in the wine long after it has been bottled."

For production without MLF and ageing either in tank or neutral barrels, Blue believes that using slow-fermenting yeasts (such as Epernay 2), compared to those that rip and heat up, is an advantage to a delicate aromatic variety such as Marsanne. "Yes, there is the risk of a stuck fermentation," he

admits. "But that's when I opt to add some PDM, or as the season progresses, pitch the tanks."

Cellar ageing

Half of the winemakers interviewed are using 20% to 30% new oak in their barrel ageing regime. The other half are using only neutral oak.

"I don't think we know yet which is the preferred regime," Cobb maintains.

Blue indicates such decisions depend on style goals. Right now, he's opting for a subtle style. The wine remains in neutral fermentation barrels on gross lees, stirred every three weeks, for about seven months.

In general for these winemakers, the wine remains on lees for three to nine months.

To enhance balance, Cline ages about 10% of the stainless steel fermented Marsanne in barrels (of which less than 10% are new) for a couple of months.

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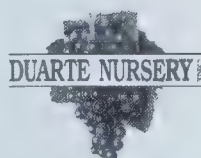
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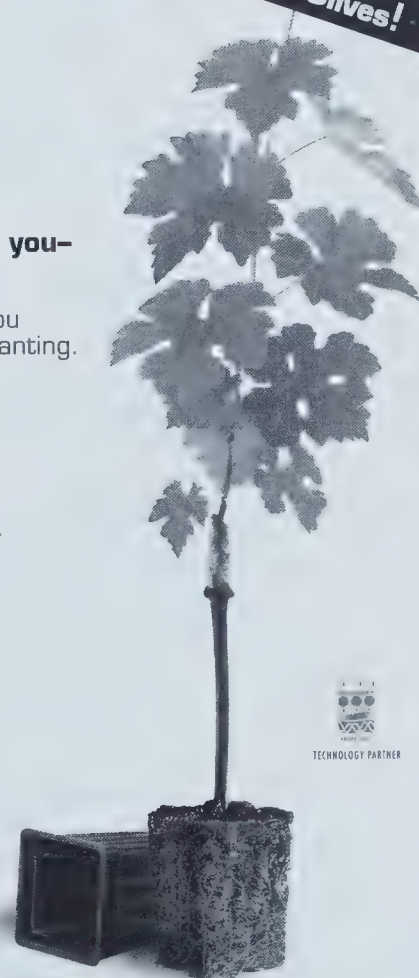
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VARIETAL REVIEW

Blending varieties

Beckmen and Karly bottle 100% varietal Marsanne. However, in past years, Karly has blended up to 17% Roussanne, but these vines were diseased and removed in 1998 and replanted with the Tablas Creek clone in 1999.

Bonterra adds 0.6% Chardonnay *muté* to sweeten the finish very slightly and lessen the perceived austerity of Marsanne.

Cline includes 10% to 15% Viognier for fruit complexity, added elegance, richness, and viscosity.

To retain a floral bouquet and high-toned apricot and peach flavors while showcasing the desired nutty qualities of Marsanne, Crawford blends in 25% Roussanne. He also notes that, because the Marsanne has undergone partial MLF, Roussanne (which has not undergone MLF) has a big impact on reintroducing fruit characters.

To add complexity and aromatics without overpowering delicate varietal flavors, Horton may use up to 5% Viognier and/or 2% to 4% Chardonnay from the Muscat clone of this variety.

What is Marsanne like?

Depending on where it's grown and vine age, Marsanne as a wine invites a variety of descriptors. Participants agree that, independent of source, it has peach, apple, melon, honey, and citrus aromas and flavors.

Hints of green olive and green herbs, not as a measure of being unripe, but as part of the wine's taste profile may be detected in a young wine. Honey is also a common descriptor, but tropical and passion fruit are most perceived by Beckmen, possibly, he suggests, due to the longer growing season in Santa Barbara County.

For the first time in 1999, Karly Marsanne developed tropical flavors.

"As the vines have aged, we've noticed significant changes in both aromas and flavors," Cobb maintains.

Cline and Horton agree that their wines develop roasted, nutty flavors after four or five years in the bottle. This is not an overt oxidative character, but more like hazelnuts and almonds. "I view Marsanne as a fairly austere varietal," Cline contends, "but of the three Rhône white varieties grown in California, Marsanne ages the best."

"Overall the wine has more flavors than aromas. Without oak ageing, it has structure and richness and a honey character that is not from botrytis."

BLIND TASTING NOTES

1999 Beckmen Vineyards Marsanne, Santa Ynez Valley, CA

Color/Aroma: pale straw yellow; grassy, cat's piss, pink grapefruit, tropical, passion fruit, and smoky.

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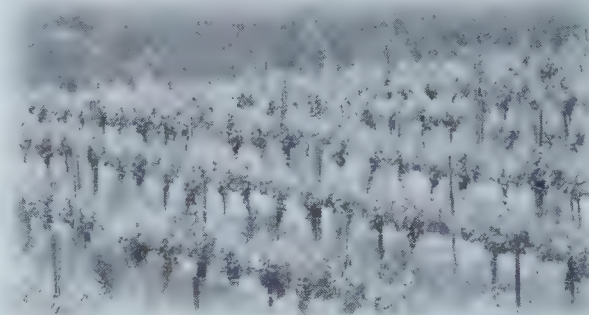
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VARIETAL REVIEW

Flavors: key lime, melon, herbaceous, grapefruit, and fresh tropical.

Balance/Finish: long with good balance, oaky and citrusy.

1999 Bonterra Vineyards, Lakeview Vineyard Marsanne, Mendocino County

Color/Aroma: light straw yellow; sage in bloom, honey, clover, melon, citrus, peach, vanilla.

Flavors: vinous, slight green herbs, melon, and overall good follow-through from nose.

Balance/Finish: full-bodied, long, rich, and pure fruit expression.

1999 Cline Cellars Marsanne, Los Carneros, CA

Color/Aroma: medium straw yellow; slightly floral, bright fruit, peaches, apple, honey, dusty earth, flint, some vanilla, and hints of nuts.

Flavors: slight honey, peaches, mineral, nutty, and clean.

Balance/Finish: rich, balanced mouthfeel, a little flat.

1998 Horton Vineyards Marsanne, Orange County, VA

Color/Aroma: straw yellow; melon, peach, lime, mineral, slightly earthy, green herbs, and vanilla.

Flavors: follow aromas with stone fruit and peach, slightly green flavors, and tart.

Balance/Finish: viscous, moderate oak tannins, soft, round, lingering citrus, and clean.

1999 Karly Estate Marsanne, Amador County, CA

Color/Aroma: medium gold; slightly pungent, honeydew melon, tropical fruit, and toasty oak.

Flavors: stone fruit, honey, grass, peach, citrus, spicy, and leesy.

Balance/Finish: low acid, slightly bitter, and somewhat short.

1998 McDowell Valley Vineyards Marsanne, Mendocino County, CA

Color/Aroma: straw yellow; slightly floral, sweet ripe fruit, honeydew melon, honey, pears, and hints of nuts.

Flavors: lime citrus, forward honeydew melon and pears.

Balance/Finish: rich, citrusy, balanced acid, good structure, and slightly nutty.

PWV thanks Cline Cellars for hosting the discussion/tasting.

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SONOMA COUNTY

Diverse geology/soils impact wine quality

BY W.H. Terry Wright, PhD.

Quality winemaking starts in the vineyard. Over the years, the factors that define a quality vineyard have been revealed one by one. Whether the wines are rich, flavorful Bordeaux of the French *terroir*, or the wonderfully fruity Zinfandels of Sonoma County, the final product is influenced by a number of factors in the vineyard environment.

Winemakers realize that, in order to produce a superior wine, they need to be part horticulturist, part soil scientist, and part meteorologist and climatologist in order to achieve their goal.

The concept of *terroir* incorporates the notion of site and location which includes all factors that work together to create a region with particular wine characteristics. Today, winemakers are extremely selective in choosing rootstock, varieties, and clones to take advantage of the greater understanding of *terroir*. Now we are becoming aware of the scientific basis for our experience with *terroir*.

The work of Deborah Eliot-Fisk and Ann Noble of the University of California at Davis suggests that unique *terroirs* produce distinct wines.

The foundation of *terroir* is the underlying geology and the soils that develop from rocks. We have heard vineyard legends about the relationship between a certain rock, soil, and grape quality.

Looking at the geology of some representative *terroirs* in Sonoma County, may explain the evolution and the character of the soils and their effect on wine quality. Combined with some

grower and winemaker experiences with these *terroirs*, this could prove to be useful information for all *terroir*-ists.

Soils

Soil is developed in layers by the slow process of weathering, which results in the chemical and physical breakdown of rock and minerals at the earth's surface. Organic material from plants dominates the dark surface, "O," soil layer or horizon. A second, "A" horizon, contains some organic material mixed with minerals.

Weathered minerals dissolve and leach out of the "A" horizon and accumulate in the "B" horizon. Below these is a third, "C," horizon of weathered

rock or parent material above the bedrock. The thickness and character of these layers vary with composition of the parent material, climate, slope, time, biota (soil organisms and plants), and human impact.

The soil's role is to supply water and nutrients to the vine. Nutrients are dissolved in water, so soil's important physical properties are the texture (grain size) and structure (the shape and arrangement of particles), which determine soil permeability or the ability of water to pass through the soil. Where permeability is low, water is retained and the soils have poor drainage.

Composition of the soil, especially clay content, affects the permeability and

Table I: Geologic Formations, Soils and Viticultural Areas.
Refer to Soil Survey of Sonoma County (Miller, 1972)
for specific soil descriptions.
(ss) indicates Franciscan sandstone parent
(serp) indicates serpentine soils

Formation	Soil Series	Viticultural Areas
Franciscan Complex	[Yorkville-Raynor-Henneke Montara-(serp)] Boomer (w of Dry Creek), Comptche [Kinman-Dibble, Josephine-Atwell-Mayman- Suther-Kneeland-Hely-Hugo- Laughlin, Atwell (ss)]	Russian River, Alexander Valley, Sonoma Valley, Knights Valley, Dry Creek, Green Valley
Wilson Grove Formation	Gold Ridge, Sebastopol (Altamont), Empire	Russian River, Green Valley
Sonoma Volcanics	Kidd, Forward, Laniger, Felta, Goulding, Spreckles, Toomes, Guenoc, Cohasset	Knights Valley, Sonoma Mountain, Sonoma Valley, Alexander Valley
River and terrace deposits – Glen Ellen formation (gravels)	Yolo, Arbuckle, Huichicha, Haire, Cotati, Zamora, Cortina, Los Robles, Pleasanton, Cole, Clough, Blucher, Casper (uplifted marine terrace), Cole	Russian River, Alexander Valley, Dry Creek, Carneros, Sonoma Coast (high ridges)

water retention properties. Thus a sandy or pebbly soil will have high permeability, the water will pass through the soil rapidly, and a clayey soil will restrict water flow, and may even pond water. Organic matter (humus) in the soil will also favor water retention.

Pebbles and rocks in the soil also seem to be a major factor in permeability. In clay-rich soils, they tend to break up the soil and provide avenues for water percolation and root penetration. On the surface, they will absorb heat during the day and promote slow cooling in the evening.

Roots will penetrate up to 30 feet into the soil and rock below to reach water. Roots are opportunistic, they follow layers with more water and nutrients, seeking out pockets of sand or gravel with higher water content.

Nutrients come from dissolved minerals and organic materials. Nitrogen, phosphorus, and sulfur come from organic material decay (humus), and calcium, magnesium, potassium, aluminum and iron are released by chemical weathering of minerals.

In order for nutrients to be available, they need to be in ionic form, as individual charged atoms. Thus for calcium to be available, it must be in the form of



In this photo of Dehlinger Vineyards in Russian River Valley, vine vigor reveals boundaries between different soil types.

Ca⁺ cations, which then can be transferred to the plant. Water in the soil will carry ions to the roots and pass through the root walls to feed the growth.

In order for the nutrient ions to be available to the plant, they must be retained in soil and held there. Clay minerals and humus have large surface

area per unit weight and also have surface charges that attract positively and negatively charged ions such as nutrients. This is called the cation exchange capacity (CEC) on soils reports. Thus they are ideal for cation exchange and act as harbors for nutrient cations, such as calcium, magnesium, and phosphorus, which can exchange with hydrogen cations from roots and make the nutrients available for plant uptake.

Clay and humus also control physical properties of the soil. They may form flexible elastic bridges between soil particles to maintain soil structure and preserve porosity even after being compacted by heavy equipment.

Talking with winemakers and observations of soils in award-winning vineyards indicates that the best flavor in grapes seems to originate in soils that are intermediate in permeability, with either layers of sand and a clay-rich B horizon, or with a mixture of grain sizes from clay to sand. This assures a slow, steady supply of nutrients to the vine.

In Sonoma County climates, the water supply tails off naturally at the end of the growing season to add water stress and concentrate flavor.

The bedrock of many great wine regions of France is limestone, which is composed primarily of the mineral cal-

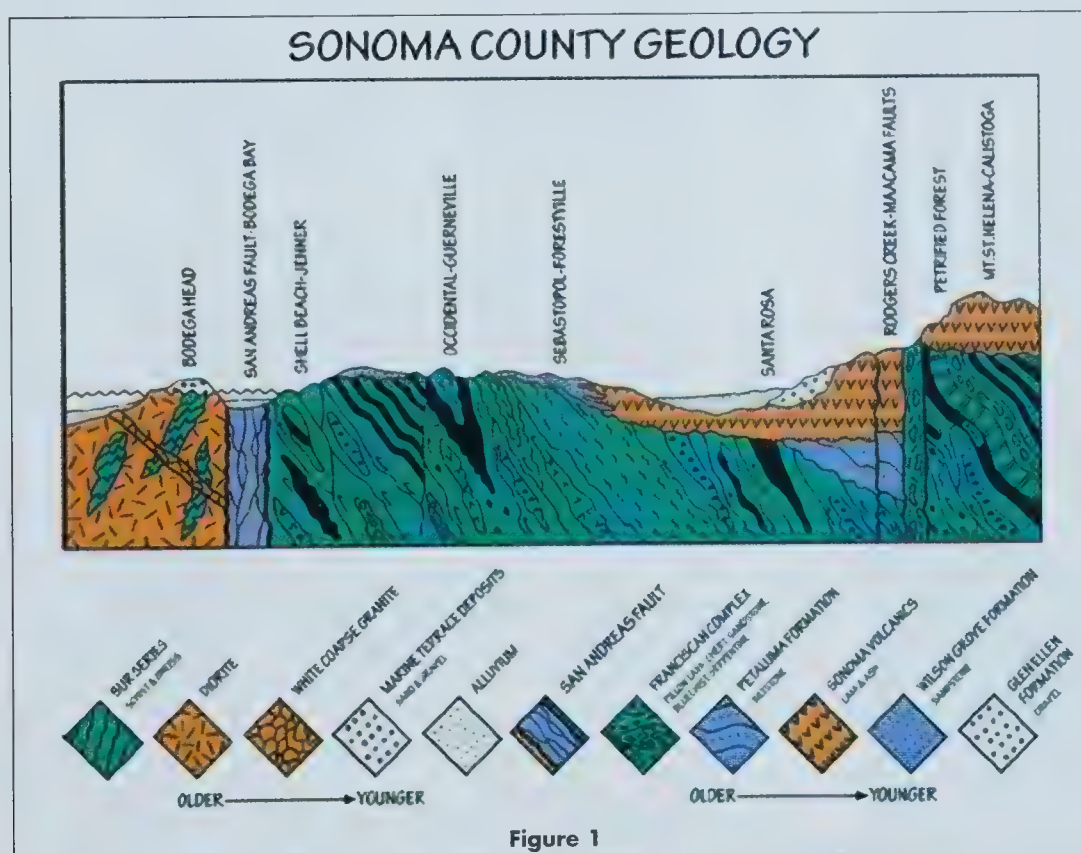


Figure 1

WINEGROWING

cite. This mineral weathers chemically to supply calcium ions to the soil solution, and it also makes the soil less acid. Lower acidity enhances nutrient availability of calcium and magnesium. Calcium also tends to aggregate clay, that is, it breaks up the layers by allowing clay minerals to combine with organic matter to form clay aggregates, which are clay grains stuck together in sand-size particles.

This structure improves permeability and enhances water retention. Sonoma County has virtually no limestone, so natural calcium comes from mineral weathering in volcanic rock. Many soils are acid as a result, and it is a common practice to add lime or gypsum to increase pH and calcium levels. This is a short-term solution and only lasts a few years.

Sonoma County geology, geologic history and soils

Sonoma County geology is a two-sided plate (Figures 1-transect, 2-map); the San Andreas fault serves as the dividing line. Geologists organize rocks into units of different rock types called formations in order to decipher the geologic history. The diagram shows these units with different colors and patterns.

A trip through Sonoma County from west to east across the San Andreas Fault is a geological journey through several different geological worlds.

Rocks west of the fault are ancient granites with overlying sand and gravel. Granite is only exposed on Bodega Head, too near the ocean to be of much use for viticulture, although planting there would emulate vine-

yards in the granite soils in Northern Côte du Rhône.

Granite originated when molten igneous rock deep in the earth cooled 100 million years ago. This granite formed at least 345 miles south and was moved north along the San Andreas fault by tectonic movement to its present position over the last 29 million years.

Gently sloping terraces perch above the coast. These are erosional surfaces with a thin covering of sand and gravel that originated on ancient beaches and beneath the waves off shore and are being pushed up by pressures along the fault. Some of these surfaces have been uplifted to more than 1,000 feet above sea level and provide the sandy soils in some high-elevation Sonoma Coast vineyards.

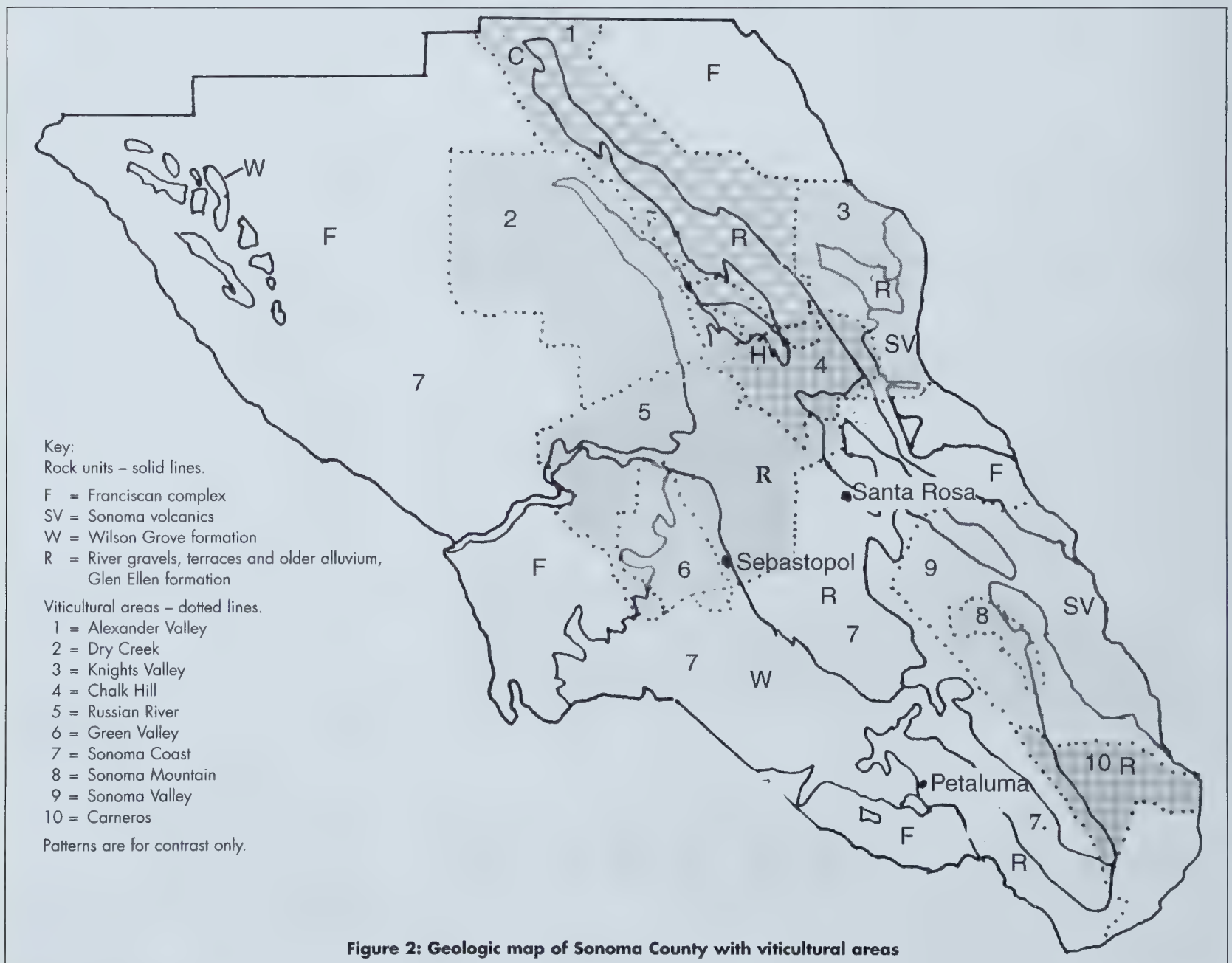


Figure 2: Geologic map of Sonoma County with viticultural areas

East of the San Andreas fault, there is a rich smorgasbord of rock types, representing a complicated geological history. The result is a high diversity of soil types; each type provides its own conditions of texture, structure, and nutrients. There is a greater variety of soils in Sonoma County than in all of France. Its meso-, macro-, and micro-climates are also perfect for grapegrowing, so the combination of soils and climate make Sonoma County ideal for growing a variety of great wines.

Figure 1 shows a conceptual, simplified cross-section of Sonoma County geology with the major formations listed. Figure 2 is a simplified geologic map with appellations outlined. Table I lists the geologic formations and their soil series and associated viticultural areas.

Deep oceans and subduction — Franciscan Complex

The oldest bedrock occurs on steep slopes and high hills and mountains in

northern Sonoma County. Called Franciscan Complex, from exposures near San Francisco, it is an eclectic collection of different rock types that dates back 150 million years and is as young as 15 million years.

Mostly oceanic in nature: Franciscan Complex includes marine sediments, along with iron-rich igneous volcanic, plutonic, and metamorphic rocks. These rock types are mixed together by faulting at a fundamental geologic boundary called a subduction zone, where the ocean floor tectonic plate dives under the continental edge.

The result is *melange*, the French word for mixture, with a texture like rocky road ice cream. Harder rocks resistant to faulting are like the nuts, marshmallows, and chocolate chips. The weak rocks are deformed along faults, almost plastically, like the ice cream matrix. The pattern on Figure 1 shows this relationship.

Melange is particularly well exposed along the Sonoma County coast and high ridges between Bodega Bay and Gualala. There are Franciscan rocks in slopes and ridges above the Russian River, southern Dry Creek and the crest of the ridge running from north of Carneros in a band along the Napa-Sonoma County border, through Knights Valley, and along the high ridges east of Alexander Valley. (See Figure 2 for location.)

Similar rocks form large areas with continuous layers of sandstone, conglomerate, and iron-rich igneous rocks in the ridges west and east of Dry Creek Valley. The igneous rocks there are part of the ocean floor that was scraped off onto the continent during subduction. The soils in these areas are sandy or pebbly when developed on sandstone and conglomerate. Red pebbly clay develops from iron-rich igneous rocks, particularly well displayed in the west side of upper

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Rock distribution is random as are the soils that result. There are veins of serpentine containing magnesium soils with potentially toxic nickel levels, blocks of hard sandstone, which form

sandy soils; and iron-rich rocks, which result in red clayey soils.

The recent land rush to find quality vineyard sites has resulted in development of slopes on Franciscan rocks, most notably at Gauer Ranch above Alexander Valley and Twin Hills Ranch near the Russian River.

The varied soils in these areas will open up new challenges for vineyard management. The best areas for development will be on the soils developed from sandstone and shale marine sediments; places to avoid would be areas of *melange* with Serpentine and other high magnesium-content soils.

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Shallow seas — Wilson Grove Formation

In west-central Sonoma County, the landscape opens up to rolling hills and relatively gentle slopes near Sebastopol. This topography is typical of the Wilson Grove Formation, a fine-grained, shallow marine sandstone that formed in an embayment of the ocean three to five million years ago. It sits on top of Franciscan rocks and can be 1,000 feet thick. Fossil clam shells demonstrate marine origin and show up in wells and outcrops along River Road just east of the Trenton-Healdsburg road intersection.

The sandy loam soils of the apple-growing region of Gold Ridge-Sebastopol form as a direct result of breakdown of Wilson Grove rock. The low ridge running from Forestville to Sebastopol and south to Cotati is the classic *terroir* of this association, now being recognized as prime land and climate for Pinot Noir and Chardonnay. In some areas, this sand has small, rounded pebbles of various colored rocks (mostly eroded from the underlying Franciscan), which appear scattered about the surface. Similar rocks and soils occur in the northwest county, capping ridges north to Annapolis and providing sandy soils for high Sonoma Coast vineyard sites.

Taste of *terroir* at Dehlinger Winery

At Dehlinger Winery (six miles north of Sebastopol), Tom Dehlinger and vineyard manager Marty Hedlund have mapped soils using an auger for samples, looking at surface soils, and observing vine vigor. Aerial photos of vine vigor late in the season show vividly the boundaries between different soil types (Figure 3). The vineyard has been divided into blocks based on soil types, and the blocks are harvested individually. Their project was described by Richard Smart (*PWV* Nov/Dec 1995) as a prime example of viticultural management of *terroir* factors.

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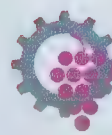
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Dehlinger has two basic soil types. The most flavorful grapes for Pinot Noir, say Dehlinger and Hedlund, come from reddish Altamont (Sebastopol) hilltop soils that have 18 inches of silty sand with some pebbles underlain by a red clay layer and then a golden sand below.

Soil characteristics include medium permeability and good water retention, obviating the need for irrigation. They let the water stress come on naturally as harvest approaches. The soil is naturally acid, so they have treated it with lime and gypsum to increase calcium content, which neutralizes pH and allows more efficient nutrient transfer.

Octagon (top of hill), Altamont (red soils on upper slopes), and Gold Ridge (deep silty sandy soils) vineyards are all planted with Pinot Noir, same clone, same rootstock. Only the soil is different.

Soil permeability is highest in the Gold Ridge silty sands and lower in the Altamont and Octagon soils, which contain clay layers or a moderate amount of clay. Phylloxera organisms cannot survive and multiply in this type of soil, so there has been no effect in this area. Wines from these vineyards are all extremely flavorful with deep lingering berry flavors.

The color and nose of the Gold Ridge wine is definitely lighter, with a garnet and orange color, and herbaceous with sweet fruit hints of strawberry and sage.

The Altamont wine is deeper in color and higher in tannin with blackberry, plum, cherry, and jammy flavors, and no hint of herb.

The Octagon wine also has no herbal qualities and is dominated by rich complex berry nose and taste, with more tannin than the others.

Dehlinger and Hedlund believe that soil permeability and clay content are the primary reasons for these differences. Considering consistent wine rating scores in the mid-90s and the winebid.com prices of \$100 per bottle and more, the care Dehlinger and Hedlund have taken with their soil differences has paid off.

Volcanos in eruption — Sonoma Volcanics

If you visited Sebastopol three to six million years ago, you would be floating in the Wilson Grove Sea, but your attention would be dominated by erupting volcanoes to the east. From Mount St. Helena south to San Francisco Bay and extending from the east side of Santa Rosa plain to the east side of Napa Valley, volcanic cones and

fissures erupted dark lava and explosions formed thick white piles of volcanic ash.

One explosion flattened a forest of redwoods, quickly buried them in ash to be revealed today as fossil trees at the Petrified Forest near Calistoga. The slopes of Sonoma Mountain, the west side of the ridge that extends north of Sonoma to Mark West Creek, the hulk of Mount St. Helena, and the east ridge of the Napa Valley are all eroded volcanic deposits of the Sonoma volcanics.

Soils of the Sonoma Volcanics are also highly variable in type, thickness, and extent. At Benziger Family Winery, Mike Benziger and Alan York have used soil and slope aspect to divide their vineyard in Glen Ellen into "flavor blocks," which are all managed individually.

York describes their concept of "biodynamic farming" of different *terroirs*, where they use internal organization for each block, managing the vines to match soil conditions.

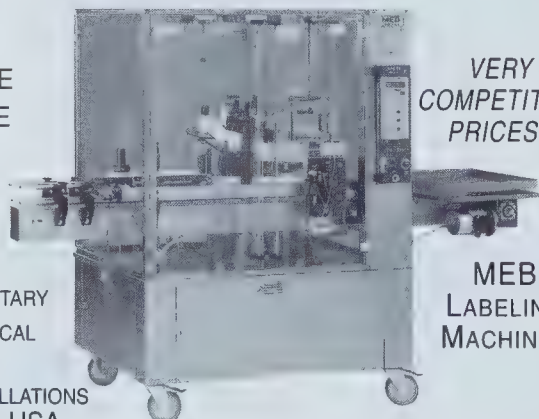
The volcanic parent material dictates soil type. On the east side of Benziger's vineyard, iron-rich volcanic breccia and lava flows predominate. The soils have a moderate clay content, which provides a slow steady supply of nutrients and water up to the end of the growing season. The



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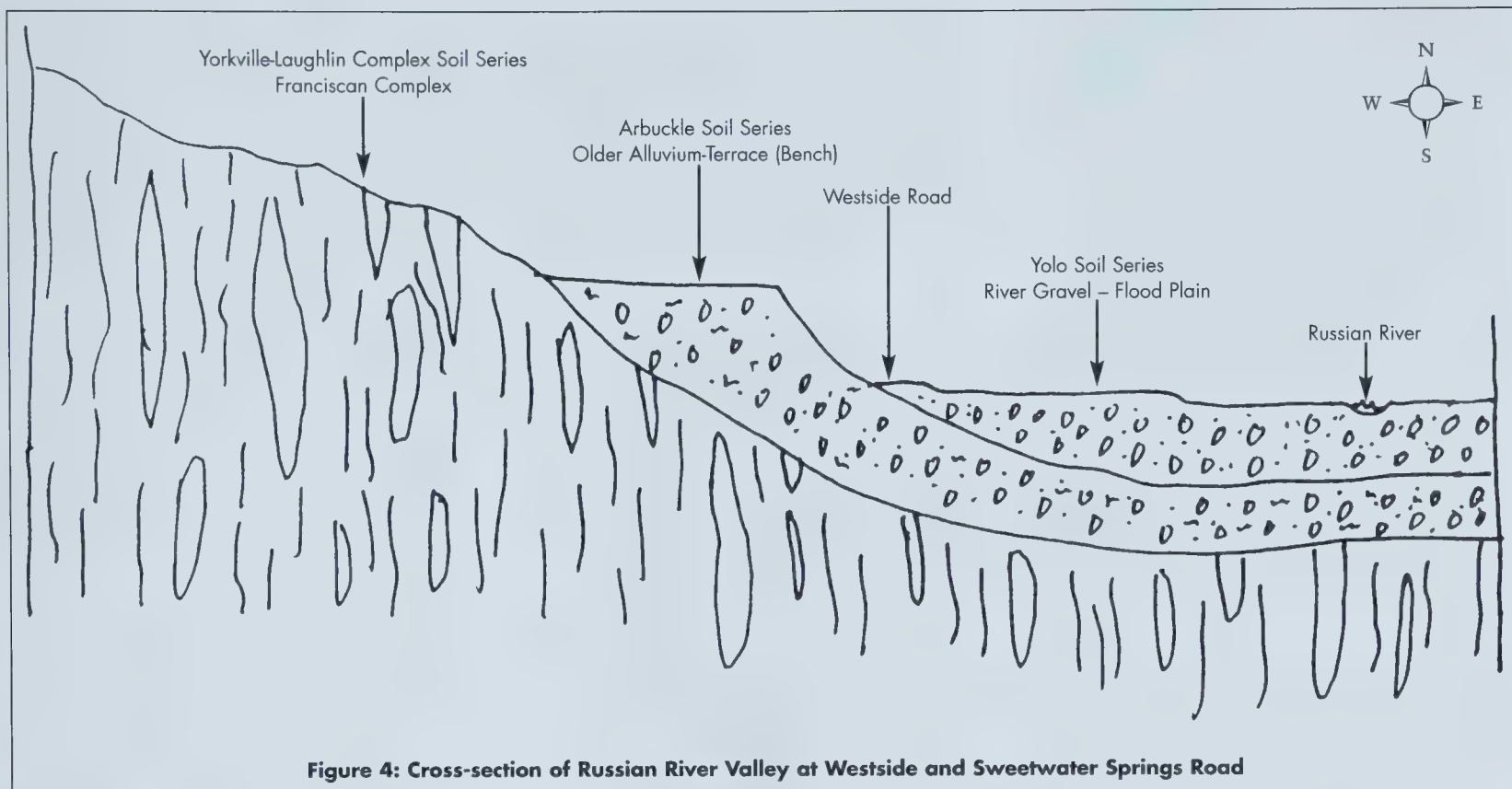


Figure 4: Cross-section of Russian River Valley at Westside and Sweetwater Springs Road

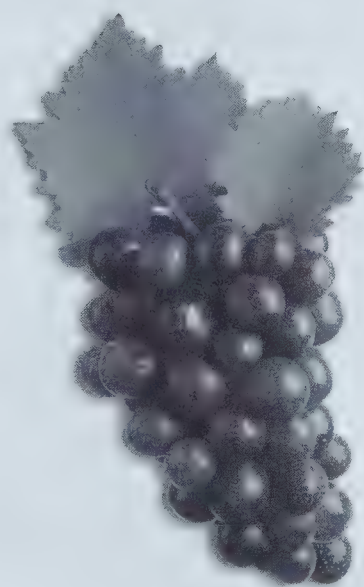
soil is deep here, which translates to high vigor. Row spacing and canopy management are used to concentrate flavors.

Benziger's southwest block has sandy, well-drained soils with little clay, developed from Sonoma Volcanics ash. In vineyards with this type of soil there is no humus and few charged clay particles to attract and harbor nutrients. Water drains rapidly through the soil, carrying most nutrient ions below root level producing natural nutrient and water stress.

Rivers and present erosion

Since the volcanos subsided, uplift and river erosion have been the dominate geologic forces, which continue today. Pressures along the San Andreas and parallel faults inland actively push ridges up and drooping valleys.

Older river deposits include sand mixed with pebble and cobble layers capping ridges near Glen Ellen and named for that town. Glen Ellen formation cobbles also cover the hills north of Mark West Springs in a band that extends intermittently to Knights Valley. Volcanic ash mixed with the Glen Ellen gravels weathers to give some areas moderate clay content.

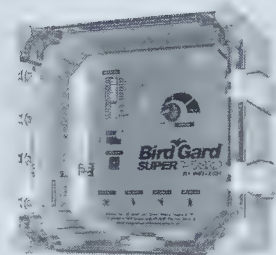


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The rolling hills of the Santa Rosa Valley and north to the ridge between Windsor and the Russian River, as well as the hills south of Highway 12 in the Carneros district, are also older alluvium. This is a coarse, cobbly soil that generally has very high permeability.

The Russian River established a meandering course to the ocean while the area was still relatively flat. It established a path parallel to faults in the Alexander Valley, but flowed west to the ocean across a low relief plain. In the last three million years, as uplift increased, the river cut down as

the mountains rose up, forming its direct path to the ocean in a steep canyon.

As the landscape evolved, the main valleys developed by downwarping between faults. As the ridges pushed up, the debris of erosion filled the valleys with sediment. Streams and swamps occurred in the bottom of the valleys, while the sides were covered with fans of material swept by streams out of the mountains.

The interplay of uplift, fan development, and downcutting by the river formed a number of terraces or "benches" along the side of the valley between river bottom and bedrock highlands. This activity continues today. Fans tend to have coarse rocky soils mixed with sand and clay. Soils developed along the flood plain of creeks and rivers tend to be sandy, but also may have a high percentage of clay.

A cross-section of the west side of the Russian River Valley across Westside Road near Hop Kiln and Rochioli wineries shows the relationship between terraces and river floodplain (Figure 4). The wines of this area reflect the soils and topography. The upper bench, an old alluvial fan with thinner soils, produces lighter more delicate Pinot Noir with cherry flavors dominating. This soil is clay-rich and pebbly, and the site is stressed naturally by wind and lack of water. Grapes at the river level are harvested six days later than the bench. Soil is deep and fertile with a pebble overwash from creeks. Wine from this level is darker, more intense, and more fruity because of the longer cooler growing season and the steady supply of nutrients through the soil.

Clay is the key

Clay content of the soil is critical for water retention and nutrient supply and the production of deep flavors. Either a moderate amount of clay or some clay-rich layers will suffice. Pebbles also contribute to quality in very clay-rich soils by providing avenues for water movement and root penetration.

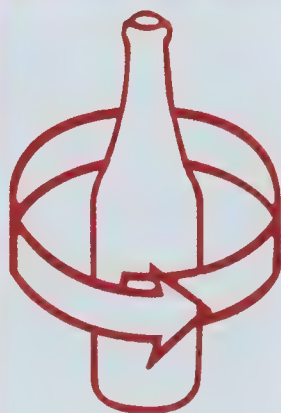
The geology of Sonoma County thus shows great diversity in *terroir*,

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WINEGROWING

with a resulting diversity in wine flavors. As winemakers learn more about the geology and soil, they will be able to take advantage of these factors to produce more world-class wines.

Soil effects on wine quality

We found the perfect comparison for soil effects on wine quality at Iron Horse Vineyards outside Sebastopol. With the guidance of Forrest Tancer (owner/partner) and David Munksgard (winemaker), two vineyard sites with Pinot Noir were selected. The rootstock, clone, exposure, trellis, and climate are the same at 120 feet elevation in the Green Valley viticultural area.

Soil contrast here comes with development on low slopes with bedrock of the Franciscan complex sandstone in Block Q and Wilson Grove sandstone in Block N. The clay content is markedly different, with Franciscan Josephine soils with 42% clay in Block Q, and Wilson grove Gold Ridge soils at 20% clay in Block N.

The Q wine is deeper in color and taste than N, with deep cherry color, berry and cherry cola flavor, and other lingering flavors, a complex wine. Whereas the N wine has light cherry color, light berry, softer tannins and a bigger nose. N is more elegant and complex than Q in general.

Further information

Specific soil maps are in "Soil Survey of Sonoma County," available from the USDA office in Petaluma. The book *Terroirs* by James Wilson has a good summary of different geological factors, focusing on soils as well as clear geological descriptions of the French *terroirs*. *The Wines and Winelands of France; Geological Journeys* by Charles Pomerol, is a classic treatment of *terroirs* now available in translation.

You can find a good discussion of soils in *The Nature and Properties of Soils* by Nyle Brady. The Sonoma County Wine Library in Healdsburg has a thick file of articles and an extensive bibliography.

I have a *terroirs* website linked to my Sonoma State University site (www-sonoma.edu/geology/wright), which

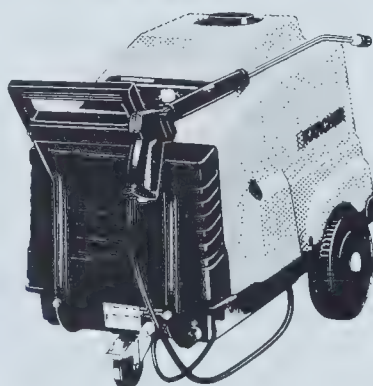
also includes virtual field trips to local geologic sites. I invite you to join an email listserv for further discussion (Terroirs-L@sonoma.edu). I welcome any questions and discussion of these concepts and will put this information on the website and listserv. ■

W.H. "Terry" Wright is a professor of geology at Sonoma State University in Rohnert Park, CA, and a consultant with a keen interest in local geology and wines. He also teaches classes at Santa Rosa Junior College and California Academy of Sciences and field seminars at Point Reyes and has a website: www.terrywrightgeology.com. Thanks to Mike Benziger for the gift of Wilson's *Terroirs* book and the opportunity to apply geology as a solution to the science of wine production. Thanks to the many winemakers and others who gave freely of their opinions and expertise.



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Where the Industry and Information Connect

How to select a good distributor

BY Veronica Barclay

Most small wineries eventually find it difficult to handle production, administration, marketing, and direct sales all by themselves. Although some may consider the services of a national marketing agent or broker to help align them with key distributors and target accounts, eventually they will have to examine the pros and cons of developing their own distributor network.

Distributor functions

A distributor acts as the intermediary that sells your wines wholesale to restaurants and retailers. Distributors:

1. Help brands gain exposure and increase distribution in their market.
2. Cover sales over a large or specified geographic area.
3. Purchase your wines FOB and pick up and haul your wines to their warehouse for storage and delivery in their market.
4. Solicit, process, invoice, and deliver orders through their own sales force and administration.
5. Extend credit to their purchasers and maintain their own collections.
6. Provide local promotion for your wines through merchandising, trade and consumer tastings, wait staff training, etc.
7. Understand the market and have a good working relationship with buyers in key accounts.
8. Offer the winery feedback on market conditions, product quality, consumer demands, etc.

Advantages

Because of their knowledge of local market trends and demands, distributors can help small brands gain entrance into key hotels, restaurants, and fine wine retail shops. They know who the top 100 accounts are in the

market and have existing relationships with the buyers at these accounts.

They also incur all the expense of recruiting, hiring, and training a wine-knowledgeable sales force. Many split their salespeople into specific on-premise, off-premise, or chain store teams.

Wholesalers can help save you time, energy, and money. They usually order in large quantities, handle their own check chasing from accounts, and offer warehousing and delivery services over a large geographic area. They can provide invaluable mini-market research on how your varietals are being received in their area.

Distributors also act as the liaison between you, the restaurateur, and the retailer. In addition to providing merchandising services such as making sure your shelf talkers and case cards are properly displayed, they are also the first ones called to handle complaints surrounding product quality, packaging, or breakage.

Disadvantages

Many small wineries complain of losing control over their wines when placing them in a distributor's portfolio. Pricing, lack of sales, and not knowing who is actually consuming their wines are common complaints. Small brands often feel they don't get enough attention or feel lost in a wholesaler's "book." Some distributors take advantage of wineries by not paying their invoices on time or issuing excessive or unauthorized charge backs.

If you could sell all your wine from your tasting room or efficiently manage your own sales and marketing within your financial and time constraints, you wouldn't need wholesalers. But with market conditions constantly changing (shifts in consumer demands, restaurants and retailers

going out of business, etc.), it is unrealistic to think that you'll be able to stay on top of it all. Taking the time to align yourself with the right distributor can bring you a profitable and long-term partnership.

Here are some tips for finding the right match for your needs.

Where to look

Where do you start looking for a reputable distributor? Wine & Spirits Wholesalers of America publishes an annual directory that lists its members alphabetically and by state, including wholesaler management personnel, addresses, and phone and fax numbers. The 2001 edition can be purchased for \$150 from WSWA, 805 15th St. NW, Washington, DC, 20005, tel: 202/371-9792. There is also a printable order form available on the WSWA website at www.wswa.org

Another large, more comprehensive (and expensive) guide is the *Beverage Marketing Directory*, which indexes wholesalers by state, brand, and key personnel. It also lists each company's annual sales, key brands carried, and number of employees. Tables and charts of marketing trends over the last 10 years in every beverage category are included, along with trade organizations and industry suppliers. Copies are available for \$895 by calling Beverage Marketing Corporation at 800/332-6222 or through its website at www.beveragemarketing.com. This index is also available in some business libraries.

One of the best ways to find a good wholesaler is to ask friendly neighbor wineries which distributor they use in your projected target market. Find out who the key players are, if they pay their bills on time, and if the winery is happy with sales and performance levels.

You can take this one step further by calling restaurants or retailers you would most like to carry your wines to learn which wholesalers provide them with the best service. These referrals can be a good way to introduce you to a prospective new distributor, especially if a key account "recommends" them.

What to look for

Conduct your search for a distributor as if you were looking for a business

partner. Examine their background, size, and financial stability. How long have they been in business? How big are their annual wine sales? Do they also sell beer or spirits as well as wine?

Study the specific geographic selling areas covered by the distributor. Many states require distributors and wineries to specify exact counties or territories where they will sell your wines. Be sure your licensing and compliance requirements can be met before assigning specific counties or granting statewide exclusivity.

Who are the key personnel and operations managers? Try to find out how many salespeople the distributor has on the street. Are there separate warehouse locations or branches?

If you are a new or relatively unknown brand, seek out distributors that carry other limited production labels. Most likely they'll be smaller but should have a skilled, on-premise sales team that understands how to gain wine-by-the-glass and wine list placements. Because you do not have a "shelf presence," you'll need on-premise business to help you gain exposure. Once

consumers try your wines, they'll want to know where they can buy them, and the retail business will follow.

If your brand is established and has enjoyed favorable publicity, ask the potential distributor how they plan to preserve your image and increase your market share. Ask them to identify their top 10 on-premise and off-premise accounts.

Obtain a recent copy of their price book from the distributor or from another winery already represented by them. Look for wineries that may compete directly with your label. Brands with similar sounding names, or labels with your exact appellation and price point may cause confusion for sales staff, buyers, and consumers.

Study their mark-up structure. To your FOB case price, the distributors will add their "laid-in" costs (FOB plus freight and excise tax) to "land" your wine in their warehouse. They are entitled to take a mark-up (usually 18% to 45%) over this landed price. This figure becomes the "case one" price offered in their book and then is "discounted back" based on volume purchases or special programs offered. Retailers will then

take their mark-up (15% to 50%), which will give you a range of how your wines will be priced on their shelves.

What distributors will expect from you

Be prepared to have to "sell" your brand to distributors. Not every distributor you approach will accept you with open arms. Do your homework — anticipate the answers to their questions.

Have you sold product in their market before? If so, through whom and what happened? Do you have sufficient inventories to provide a steady, long-term supply?

Distributors are looking for brands with attractive packaging, consistent quality, and a unique story. Do you qualify? When describing your wines, be sure you distinguish yourself from other brands. Stress the benefits of your wines (good value, depth of product line, etc.), as well as the features (flashy package, multiple sizes, etc.).

What exactly do you want the distributor to do? Be realistic. Perhaps it does not

Continued on page 71

Distributor Relations Report Card

How would wholesalers grade your winery?

GRADE (A= Excellent B = Good
C= Fair D = Poor F = Failure)

Does your winery provide the distributor with the tools needed for success? Do you:

☐ Provide wholesaler with accurate information about winery's product line, policies, and order procedures.

☐ Possess a copy of the wholesaler's "book." Know what other wines the distributor carries and their wholesale price points.

☐ Jointly establish monthly sales and distribution goals by varietal for the fiscal year. Provide clear direction, prioritization, and encouragement in establishing distributor's methods in order to achieve these projections.

☐ Maintain and update distributor profile and sales roster. Know wholesaler's key principals, department heads, and sales managers.

☐ Consistently maintain regular communications with key principals via phone, e-mail, fax, or mail. Advise of upcoming vintage changes, awards and reviews, or changes in winery personnel in a timely manner.

☐ Understand the wholesaler's laid-in costs, margins, and discount structure for each label. Know retail shelf price range of each product.

☐ Establish an annual programming budget. Jointly develop and implement incentives tailored for distributor and its market. Assist wholesaler in monitoring results mid-way through programs.

☐ Provide adequate wine samples with a clear sampling and charge back policy.

☐ Does the winery stay on top of paperwork. Handle inquiries, credits, compliance requirements, etc., in an efficient and timely manner.

☐ Assist wholesaler in developing target account lists. Know your brand's "Top 10" on-premise and off-premise accounts.

☐ Review distributor's monthly depletion report by item and examine house conditions, present market status, and ending inventories.

☐ Schedule regular market visits of winery principals to support distributor efforts via winemaker dinners, tastings, press/trade luncheons, etc. Utilize sales meetings to update staff on latest winery developments and schedule "ride-alongs" with sales people.

☐ Provide adequate point-of-sale materials, such as shelf talkers, case cards, table tents, brochures, tech sheets, and newsletters.

☐ Anticipate wholesaler's objections before they arise. Identify areas of concern and initiate recommendations to resolve them. Respond with good follow-up skills to help achieve positive results and reach mutual goals.



SHOWCASE OF PROFESSIONAL SERVICES

PRACTICAL
WINERY & VINEYARD

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Motto Kryla & Fisher LLP (MKF) is a leading firm of wine business advisors, providing business consulting, economic and market research, and financial- and tax-planning services to over 200 wineries and owners of thousands of vineyard acres.

As the only business advisory firm devoted exclusively to the premium wine industry, MKF is uniquely qualified to help clients be more successful by offering services that draw on its industry specialization and expertise. MKF's consultants provide forecasts and business planning, strategic marketing plans, benchmarking, operations review, sale and acquisition services, winery and vineyard business valuations, and litigation support.



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MKF's unique financial reports provide insight into wine business results and trends. MKF tax specialists provide strategic tax planning for individuals, wineries, and vineyards, for specific transactions, and for estate and gift taxes. MKF is often involved in an advisory capacity in major premium wine industry transactions.

MKF RESEARCH is a leading economic research firm for the U.S. wine industry, conducting and publishing original research and economic reports on the wine market. Current publications include *Wine Trends*, *Grape Trends*, *US Wine Demographics Report*, *MKF WineStats*, *MKF Vineyard Economic Study*, *Economic Impact of the California Wine Industry*, *Economic Impact of the Washington Wine Industry*, and a series of wine industry newsletters entitled *The MKF Advisor*.

For more information, contact:

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The Wine Business Center

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website: www.mkf.com

OZBORNDOLI ARCHITECTURE

ozborndoli Architecture designs wineries from basic to bodacious. With over 30 years of architectural experience, it has designed both micro-wineries like the 2,500-sf Paloma (St. Helena, CA) and mega-wineries like the 250,000-sf Clos du Bois (Geyserville, CA). ozborndoli has the technical skills to address the needs of all varieties of wine and design talent to express beauty in a utilitarian structure.

ozborndoli possesses expertise in all phases of winery development including master planning, feasibility studies, project management, architectural and interior design. The firm will oversee your project from conception to completion and finish on time and in budget.

ozborndoli has won design awards for renovations and additions to the historic Valley of the Moon Winery



(Kenwood, CA). The firm is in the final construction phase for the Sebastiani Winery tasting room and tour facility (Sonoma, CA).

Client relationships are important. ozborndoli has worked with Clos du Bois for the past 10 years and is currently completing the design of a new hospitality center.

ozborndoli's strength lies in its sense of design and ability to communicate with clients. The firm works closely with clients to produce wineries that satisfy functional needs, fit the budget, and express the desired image.

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Susan Ryan

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PLEASE SEE THE OZBORNDOLI ARCHITECTURE AD,
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STEVEN D. PULTS, A.I.A., & ASSOCIATES

Founded in 1980, Pults & Associates provides a complete range of professional architectural services specializing in winery design with emphasis in Monterey, San Luis Obispo, and Santa Barbara counties. Pults & Associates' services include feasibility, master planning, architectural design, construction document preparation, construction administration, and agency processing.



Professionals at Pults & Associates feel that buildings are distinctive tools in the winemaking process, and their designs are tailored to each client's stylistic winemaking approach. From boutique wineries to world-class production facilities, Pults & Associates responds to the clients' desired image and statement of their facilities, as well as their unique and specific needs.

A partial current client list includes: Beringer Blass Wine Estates, Chalone Group, Domaine Alfred, Fetzer Vineyards, Justin Winery, Laetitia Winery, Robert Hall Winery, SeaSmoke Cellars, Southcorp Wine Estates, and Zaca Mesa Winery.

For more information, contact:

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**DAL POGGETTO &
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Dal Poggetto & Company LLP specializes in accounting, tax, and consulting services for privately held businesses and their owners, with a special emphasis in the wine industry. The firm's partners have been accountants and consultants since 1975 and have worked with companies of all sizes, from those with annual revenues under \$50,000 to those with more than \$500 million in annual sales.

The firm's services include profit-improvement studies; strategic planning; financial modeling; transaction consulting for mergers, acquisitions, and divestitures; tax strategies and business planning; as well as traditional services, such as auditing and accounting, tax planning and preparation, and accounting systems development and consulting.

The staff at Dal Poggetto & Company LLP has extensive wine industry experience and is frequently able to make cost and tax savings recommendations to clients. They have an excellent reputation for clear communication skills, technical abilities, and responsiveness to clients.

The high quality of the firm's practice is maintained by a program of formal technical training for staff that greatly exceeds state licensure requirements and the programs of most other accounting firms. The most current technologies are employed to deliver client service in an efficient and cost-effective manner.

For excellent service at a competitive cost, provided by experienced professionals with broad consulting skills tailored to the needs of the wine industry, contact Dal Poggetto & Company LLP.

For more information, contact:

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Jon P. Dal Poggetto, CPA

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Santa Rosa, CA 95401

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ASCENT LABORATORY & CONSULTING**LABORATORY & CONSULTING**

Ascent Laboratory and Consulting provides several types of services, among which are training, education, contract sensory analysis, and sparkling winemaking.

Training services include instruction in winery chemical analysis emphasizing principles of laboratory quality control and their application to a working winery. Classes are held at Ascent's teaching laboratory, allowing for hands-on use of equipment.

Sensory training for improved personal tasting skills encompasses recognition and description of wine aromas and flavors. Training in sensory evaluation principles is also offered. Advice on choosing the appropriate sensory method for interpreting winery experiments is available, along with guidance to insure these methods are correctly implemented.

Educational services range from basic presentations to comprehensive seminars on topics such as laboratory analysis, quality control, sensory analysis, sparkling wine, or other technical issues.

Ascent's contract services include sensory difference testing and descriptive analysis of wines. Its Cork Sensory Quality program, tailored to the individual requirements of each client, is an example of how combining sensory, analytical, and quality testing can benefit your winery.

Ascent also consults on the production of sparkling wines.

Visit Ascent's website at www.ascentlab.com where electronic forums allow information to be exchanged among winemakers worldwide.

For more information, contact:

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LARKIN & ASSOCIATES, INC.

Larkin & Associates has provided mechanical engineering design for wineries for over 20 years.

Located in Sonoma County, Larkin & Associates specializes in the design of heating, cooling, and plumbing systems for wineries. The firm is familiar with the special needs of wineries and winemaking processes.

Recent projects and clients include Dominus Estate, Stags' Leap Winery, Geyser Peak Winery, Cakebread Cellars, St. Francis Winery, Franciscan Estates, Ravenswood Winery, Beaulieu Vineyard, Chateau St. Jean, Clos du Val Winery, Fetzer Vineyards, Swanson Vineyards & Winery, Rutherford Hill Winery, Klein Family Vintners, Meridian Vineyards, and Kendall-Jackson Winery.

Some of the services offered especially for wineries include design of CO₂ ventilation, night-air cooling, HVAC, process waste systems, hot water systems, refrigeration consulting, and energy and moisture studies.

Through the years, Larkin & Associates has developed a reputation for high quality design and responsive service. The firm has strong continuing relationships with several wineries and with winery architects and contractors. Owner Paul Larkin shares an interest in wine and has visited wineries in France, Italy, and Germany.

Larkin & Associates wants to continue to serve the wine industry by designing cost-effective, efficient systems for wineries, large and small.

For more information, contact:

Larkin & Associates, Inc.

130 S Main St. #201, Sebastopol, CA 95472

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e-mail: info@larkinme.com

website: www.larkinme.com

PLEASE SEE LARKIN & ASSOCIATES' AD, PAGE 39.

BARBARA LINDBLOM — WINEMAKER/CONSULTANT

For 25 years, Barbara Lindblom has been working with a wide range of wines, ideas, and individuals in the wine industry. She brings a global understanding of grape growing and winemaking to her work.

In addition to general winemaking and consultation, Lindblom provides unique and innovative services in technical training, production and field trial design, and sensory program development.

She has helped her clients develop strategies and programs that have produced:

- Fine wines that reflect their origins,
- Clearer communication and understanding between growers and wineries and between wineries and their markets,
- Well-defined winemaking objectives and protocols,
- Expanded use of sensory techniques and improved production tasting practices,
- Practical experimental design.

Barbara Lindblom's clients come from all facets of the industry, and she is particularly committed to strengthening the connection between quality viticulture and winemaking. Whatever the project, her objective is always to develop a customized program that meets her client's specific needs and style.

For more information, contact:

**Barbara Lindblom —
Winemaker/Consultant**

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DICKENSON, PEATMAN & FOGARTY

From its office in Napa, CA, Dickenson, Peatman & Fogarty (DP&F) serves the wine industry throughout the states of California, Washington, Oregon, and internationally. As the wine industry has grown, DP&F has grown from eight lawyers 20 years ago to more than 19 today.

Specific wine industry expertise includes debt and equity financing, alcohol beverage licensing, land use regulation, distributorship creation and termination, key-employee incen-

tive plans, vineyard and real property purchase and leasing, and winery mergers and acquisitions.

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All members of the firm serve the wine industry in their particular specialties. For example, Richard Mendelson has served as president of the International Wine Lawyers Association and operates his own vineyard, producing specialty wines. Dick Lemon lectures widely on winery finance and vineyard leasing and is a principal of Silverado Partners, which acquired Beringer Wine Estates from Nestle in 1996.

DP&F may be the wine industry's leading law firm. For example, DP&F has handled vineyard leases in 13 California counties, represented the buyer or seller in more than 50 winery acquisitions, and represented clients in Oregon, Washington, Texas, New York, and abroad.

For more information, contact:

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Government Liaison Services (GLS) maintains one of the largest and most experienced staffs serving the wine industry. Since 1957, GLS has obtained BATF label approvals along with pursuing BATF rulings on formula submissions, lab analysis results, advertising, and many other BATF matters. GLS also specializes in performing trademark, patent, and copyright search services.

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eVINE.COM

eVine, a business-to-business e-commerce site for the wine and grape industries, provides an online marketplace where buyers and suppliers can connect and transact. eVine delivers a secure, unbiased medium for grape growers, wine producers, and suppliers to buy and sell wine industry goods. Suppliers expand their reach at low-cost, while buyers gain centralized access to a whole-source catalog, pertinent industry news, and regional weather forecasts.

eVine

Buyers can evaluate suppliers' pricing, get product quotes in real-time, and place and track orders online.

eVine provides access to price and purchase products currently available only through manufacturers or distributors; including barrels, bottles, chemicals, fertilizers, field equipment, grapevines, irrigation supplies and trellising.

Lawrence D. Fairchild is president/CEO of eVine and founder of the company. His vision is to expand the marketplace, both locally and internationally, moving beyond simple purchase transactions in developing true worldwide access to a continually expanded array of goods and services. eVine is a specialist in vineyard and winery supplies with several hundred producers and suppliers online, offering thousands of individual products.

eVine's website is live for purchases, and now offers a complete listing of industry services listings. Visit www.evine.com and explore the various products now offered for online purchase.

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For years, the wine industry has been teaming with Tragon, a global leader in consumer product optimization research. A marketing research and consulting firm, Tragon offers unique expertise in measuring and understanding customer perception.

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Tragon's key services and products are: Product Optimization (PROP®), PROP-PLUS®, Quantitative Descriptive Analysis®, Interactive QDA® Software, Voice of the Consumer, Category Assessment, Segmentation Research, Ad Claims, Consumer and Trained Panels, Quality Programs, AdvantEdgeSM,



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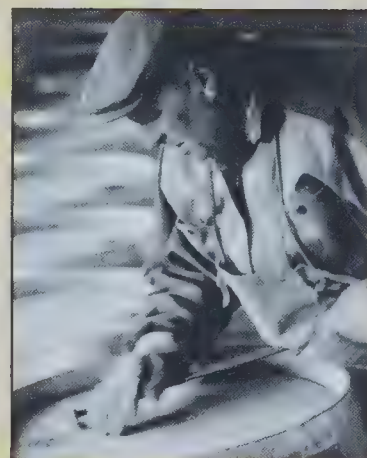
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DFS has provided the wine industry with innovative, flexible financing and servicing options for more than ten years. Programs and services include inventory financing, accounts receivable financing, asset-based lending, and more.

Deutsche Financial Services

Deutsche Bank Group



DFS understands the wine industry, and tailors programs to the unique needs of each business. These programs are designed to help clients plan their inventory and cash flow needs more efficiently, creating an environment that promotes sales growth.

In addition, DFS's aggressive use of innovative technology and electronic commerce options delivers added value to customers by minimizing administrative tasks and improving turnaround time on credit approval.

For more information on DFS' programs and services, visit its website at www.dfsc.com or call Adam Beak, Vice President of Sales, at 888/433-6100.

For more information, contact:

Deutsche Financial Services

Adam Beak, Vice President of Sales

tel: 888/433-6100

website: www.dfsc.com

PLEASE SEE DEUTSCHE FINANCIAL SERVICES' AD, PAGE 16.

THE PERSONNEL PERSPECTIVE

The Personnel Perspective, LLC, a leading provider of full-service human resource management, training, and recruitment solutions for the wine industry, has formed a new division, The Executive Perspective which focuses on corporate growth initiatives, transaction and success strate-

gies, and executive leadership development for both new and established businesses.

The Executive Perspective is a natural outgrowth of The Personnel Perspective's 15 years of expertise in strategic human resource planning, coaching, training, and organizational development.



This North Bay firm was established on the foundation of working closely with clients to determine their unique needs, and it has since built a substantial reputation for close partnerships with wine industry clients. A team of seasoned professionals is able to meet clients' human resource requirements by offering both individual and collaborative expertise. The company's operating philosophy has been to develop strategically sound, customized solutions that can be successfully implemented for lasting results.

The combination of The Personnel Perspective and its new division, The Executive Perspective, positions the company as a dominant regional consulting group able to assist organizations in developing practical and effective strategies for future growth and success, and designing administrative systems and structures that implement those strategies.

For more information, contact:

The Personnel Perspective

Carolyn Silvestri, Owner

Jeannette Feldman, Owner

575 W. College Ave. Ste. 101A

Santa Rosa, CA 95401

tel: 707/576-7653; fax: 707/576-8190

website: www.personnelperspective.com

website: www.executiveperspective.net

CRAIG ROOT & ASSOCIATES

Craig Root & Associates offers cost-effective opportunities to increase profits and enhance the visitor experience in your visitor center. Remember — you are not just selling wine — you are selling memories. An entertaining and informative visit to a visitor center stays in the consumer's mind long after more expensive advertising has faded.

The company's partial client list includes: Acacia Winery, Clos Pegase Winery, Domaine Carneros, Handley Cellars, Heitz Wine Cellars, Indian Springs Winery, Jelly Belly Candy Co., Fess Parker Winery, Franciscan Vineyards, Freemark Abbey Winery, Kendall-Jackson Vineyards, Kenwood Vineyards, V. Sattui Winery, St. Clement Vineyards, Stags' Leap Winery, Tra Vigne Restaurant, Vichon Winery, Wilson-Daniels Ltd., Zaca Mesa Winery, Niebaum-Coppola Winery, Robert Mondavi Winery, and Kauai Coffee Co.

Craig Root's consulting services cover several areas of visitor center performance:

1. Complete visitor center start-up (design review, business plan, income/expense projections, tour creation, trade relations, and complete retail room organization).

2. Appraisal of current operations (through direct consulting and/or a "mystery audit" program) to cover all phases listed in #1. Including helping staff develop strategies for more effective tour guide skills — such as voice and delivery — through videotape assessment.

3. Direct mail programs (from start-up to fine-tuning an existing program).

4. Trade relations: How to achieve better results with your VIP buyers.

5. Audiovisual presentations (video and/or multimedia).

6. Special events coordination (catering, entertainment, decorations, and event themes).

For more information, contact:

Visitor Management Resources

Craig Root & Associates

10 Upland Rd., St. Helena, CA 94574

tel: 707/963-7589; fax: 707/963-6009

SUMMIT ENGINEERING, INC.

Summit is a leader in winery project development providing consulting engineering services since 1975 to more than 200 wineries across North America.



SUMMIT

With Summit, you can hire one firm and receive the following services:

- Master Planning — facility process and equipment layout;
- Permitting Assistance — aid in permit processes for projects throughout California and other states;
- Project Management — coordination of subconsultants, client and contractor activities, budget and scheduling services, and architect and contractor selection;
- Sitework Design — grading, drainage, storm water management, erosion control, roadways, parking lots, truck maneuvering areas, and site-utilities design and mapping;
- Structural Design — tilt-up concrete, wood, metal, reinforced masonry structures, and seismic retrofitting;
- Sanitary and Process Wastewater Design — domestic, agricultural, and industrial-process wastewater management systems;
- Electrical Engineering from Summit's newest team, suite16.

Summit's trained staff looks at the whole picture of your project to make sure that all the pieces work efficiently together. Summit staff takes pride in their ability to provide timely, quality engineering with personal service.

"Let Summit turn your Dream into Reality!"

For more information, contact:

Summit Engineering, Inc.

Deirdre Van Olden

1400 North Dutton Ave. Ste. 24

Santa Rosa, CA 95401

tel: 707/527-0775; fax 707/527-0212

PLEASE SEE SUMMIT'S AD, PAGE 43.

GEORGE M. SCHOFIELD COMPANY

George M. Schofield is a financial and real estate professional specializing in vineyards, wineries, and unde-

veloped land. He offers economic and financial planning with special interests in the wine and grape industry to provide the small agricultural business with the economic and financial expertise to successfully operate in a competitive environment.

While examining economic indicators and using forecasting to aid clients in short-term and long-term planning, he also evaluates investment opportunities and, with the use of computer models, simulates possible outcomes.

George M. Schofield is a CPA and has a MBA degree from Harvard. He served 10 years as CFO of Robert Mondavi Winery before establishing his own consulting business in St. Helena in 1984. He also holds a current real estate broker license.

For more information, contact:

George M. Schofield Company

PO Box 170, St. Helena, CA 94574

tel: 707/963-3333; fax: 707/963-1285

JOSEPH W. CIATTI COMPANY

The Joseph W. Ciatti Company LLC is the wine industry's oldest, largest, and most comprehensive grape and bulk wine brokerage in the U.S. and internationally. Annual sales are over 110 million gallons (416 million liters).

The company offers a full array of wine brokerage services, including grape contracts; grape processing contracts; complete negotiations of bulk wine purchasing and sales; tasting, blending, and finishing wines by on-staff enologists; objective information, including comprehensive long-term market analysis; evaluation of inventory quality and current market values; and locating unlabeled case goods or wine for private labeling.

The Ciatti Company has the most extensive and up-to-date product line of premium varietals; generic wines; grape and fruit concentrates; brandy and high proof from grape, citrus, and grain. Internationally, Ciatti brokers exports of U.S. wines to overseas markets and imports of foreign wines to California labels and wineries, including wines from Australia, Chile, France, Argentina, and other major wine growing regions including South Africa.

Joe Ciatti, John Ciatti, Richard de los Reyes, and Greg Livengood specialize in premium coastal varietals and share responsibility for all California wineries. Chris Braun, Daniel Murphy, Dennis Collins, and Dennis Schropp cover international markets and wineries outside California. Andy Bivona and Brad Miller specialize in varietal juices and concentrates, beverage alcohol, and all natural grape colors.

For more information, contact:

Joseph W. Ciatti Company LLC

1101 Fifth Ave. #170, San Rafael, CA 94901

tel: 415/458-5150; fax: 415/458-5160

e-mail: jennifer@ciatti.com

website: www.ciatti.com

PLEASE SEE THE JOSEPH CIATTI CO. AD, PAGE 28.

PACIFIC COAST FARM CREDIT

Pacific Coast Farm Credit is a locally owned agricultural lending association, which is part of the nationwide Farm Credit System established in 1917. Pacific

Coast Farm Credit is a cooperative, owned and directed by its members. Because of the association's specialization in agricultural finance, it offers advantages to wine industry customers, including a commitment to agriculture, knowledge of the industry, tailor-made programs, local decision making, and competitive rates.

Understanding the special demands of the wine and vineyard industry, Pacific Coast Farm Credit has programs to finance virtually every aspect of your business. These programs include long-, intermediate-, and short-term financing and leasing programs.

For more information, contact:

Pacific Coast Farm Credit

PO Box 1120, Santa Rosa, CA 95402

tel: 707/545-1200; fax: 707/545-9400

e-mail: lindleyt@agloan.com

website: www.agloan.com

PLEASE SEE PACIFIC COAST FARM CREDIT'S AD, PAGE 8.

E T S LABORATORIES



E T S Laboratories has served the wine industry with practical solutions to real winemaking concerns for over 23 years. E T S is located in a custom-designed facility in the St. Helena Wine Business Center. Design of the laboratory has increased efficiency and greatly reduced analytical turnaround times.

E T S employs an array of sophisticated technologies to provide the highest quality data in the shortest time possible. Instrumentation capabilities include gas chromatography with various selective detectors (GC), gas chromatography/mass spectroscopy (GC/MS), liquid chromatography (HPLC), flame and graphite furnace atomic absorption, capillary electrophoresis, and multiple automated chemistry analyzers. All are available in-house with a variety of configurations to provide a complete range of analytical capabilities.

E T S is accredited by the American Association for Laboratory Accreditation to ISO 17025 quality standards.

E T S continues to meet and exceed your analytical needs by providing the highest standards in analytical data, quality assurance, customer service, and client confidentiality.

For more information, contact:

E T S Laboratories

899 Adams St. Ste. A, St. Helena, CA 94574
tel: 707/963-4806; fax: 707/963-1054
e-mail: info@etslabs.com

PLEASE SEE E T S LABORATORIES' AD, PAGE 34.

THE FIFTH RESOURCE, INC.

The Fifth Resource is a full-service architectural/process engineering firm specializing in the wine industry. Recent California projects include: Seguin

Moreau and Demptos Napa cooperages in Napa and Tonnellerie Radoux and the new Beringer cooperage in Sonoma County; masterplan and barrel warehouses for Franciscan Vineyards (Rutherford) and Seghesio Winery (Healdsburg); Korb River Road Hospitality, Deli, and Brewery; and Lake Sonoma Winery (Healdsburg).

Current clients of The Fifth Resource include: Beringer Wine Estates, Gallo of Sonoma, Mayo Family Winery, William Hill Winery, and the California Wine Company's expansion of Stonegate Winery.

The Fifth Resource utilizes industrial engineering methodology to do capacity planning models for many other California wineries. Services include: feasibility studies, master planning, process sizing and flow analysis, architectural design, industrial engineering, construction documents preparation, government permitting coordination, construction bidding, and project management for new and existing wineries.

Your facility needs are integrated to meet your business plan for acquisition, development, maintenance, and disposition.

For more information, contact:

The Fifth Resource, Inc.

PO Box 30, Cotati, CA 94931
tel: 707/664-1797; fax: 707/664-1710
Call one of the co-principals directly:
Ed Sohl, AIA: 707/953-8042
Jim Ford, REA: 707/484-1688
e-mail: jrford@pacbell.net
website: www.fifthresource.com

TURRENTINE WINE BROKERAGE

For more than 27 years, Turrentine Wine Brokerage has been a leader in providing fast, effective sales of pre-



TURRENTINE
WINE BROKERAGE

mium grapes and wines in bulk. Turrentine also processes contracts, including pre-season juice contracts, and sales of bottled inventory. Turrentine sold over \$100 million worth of grapes and wines in bulk in 2000.

Call Turrentine Wine Brokerage for win/win negotiations, personal service, and a comprehensive selection of premium wines and grapes. A UC Davis-trained winemaker and a Fresno State viticulturist are on staff. Ask about the *Turrentine Collateral Value Report*, inventory appraisal service, and the often-quoted *Market Update* newsletter for in-depth analysis of the grape and wine markets. Check out the Turrentine website at www.grapes-wine.com

For more information, contact:

Turrentine Wine Brokerage

Brian Clements, Steve Fredericks,
Bill Turrentine, or Michael Robichaud
122 Tunstead Ave., San Anselmo, CA 94960
tel: 415/454-4546; fax: 415/454-9665
e-mail: info@grapes-wine.com

COMPLIANCE SERVICE of AMERICA

Compliance Service of America offers the following services to the alcoholic beverage industry: ATF permits; full-service state and local alcoholic beverage licensing for producers, wholesalers, and retailers nationwide; compliance consulting; specialized advice for start-ups, acquisitions, and alternating proprietors; trademarks, and trade names.



COMPLIANCE SERVICE of AMERICA

For more information, contact:

Compliance Service of America

Dyana Nedra, Alex Heckathorn,
Sara Schorske
PO Box 43, Gardiner, OR 97441
tel: 800/400-1353; fax: 541/271-1609
e-mail: csa@csa-compliance.com
website: www.csa-compliance.com

PLEASE SEE COMPLIANCE SERVICE OF AMERICA'S AD, PAGE 35.

HOYT SHEPSTON, INC.

Hoyt Shepston has provided the beverage industry with decades of international transportation experience for both the import and export of beverages and related beverage industry articles. Established in 1850, Hoyt Shepston is one of the nation's, and California's, oldest custom house brokers and freight forwarder/OTIs offering the full range of international transportation-related services.

Whether shipping one case or a full container by air or sea, Hoyt Shepston's staff of professionals and worldwide network of agents moves the cargo with little or no effort on the part of the client, in increments or the total transportation concept, integrating all aspects of international trade from between warehouses.

Hoyt Shepston has the resources and expertise to bring products to and from its various international supply points in a seamless transaction. Hoyt Shepston specialists offer all phases of documentation services, insurance, label approvals, BATE, drawback procedures, duty and quota requirements, letters of credit, and more, all backed by 150 years of experience.

Hoyt Shepston's headquarters and warehouse are located in South San Francisco with a branch office/marine division located on the Embarcadero in San Francisco, and a worldwide web of national and international agents.

For more information, contact:

Hoyt Shepston, Inc.

Fred Hosking

700 A. Dubuque Ave.

South San Francisco, CA 94080

tel: 800/675-HOYT (4698), ext. 311

fax: 650/634-8067

e-mail: fred@hoyt-shepston.com

PLEASE SEE HOYT SHEPSTON'S AD, PAGE 37.

FRED LYON PICTURES

Fred Lyon is the wine industry's own photographer. For decades, he has traveled the globe and photographed countless vineyards, wineries, and winemakers. His images have appeared in scores of magazines, books, advertisements, and brochures.

Lyon, a 30-year Napa Valley grape grower, maintains the most comprehensive and active collection of wine-related photography in the U.S. The Lyon International Wine Library includes subjects from: the planting of the vine to the wine in the glass, workers in the vineyard to royalty in the grand salons of Europe, barrels to bottles, kitchens to wineries, enologists to chefs, and lifestyles and recreation in the winegrowing regions. Many pictures are specific, but a full range of generic subjects is also available.



For wineries and wine marketers, Lyon creates strong, graphic images for persuasive advertising and brochures. This is high-energy photography from a photographer who is friendly, rapid, reliable, and possesses an unusual breadth of experience.

For more information, contact:

Fred Lyon Pictures

3609 Buchanan St., San Francisco, CA 94123

tel: 415/922-5100; fax: 415/922-5762

email: fred@fredlyon.com

website: www.fredlyon.com

HALL & BARTLEY

Hall & Bartley is a full-service architectural firm specializing in the design and planning of wineries. Photo is the new tasting room for St. Francis Winery (Sonoma, CA).

Hall & Bartley's unique talents go beyond traditional architecture in its ability to understand and analyze the functional requirements of a modern winemaking facility.

In its 18 years of business, Hall & Bartley is responsible for the design and planning of many of California's premier wineries. Among those projects are: Flowers Winery, Marimar Torres Estate, Geyser Peak Winery, Chateau St. Jean, Kendall-Jackson's La Crema facility, Atlas Peak Vineyards, Meridian Vineyards, and St. Francis Winery.

Through careful consideration of and attention to the desires of its clients, Hall & Bartley remains a leading winery architect in the U.S.

Hall & Bartley's current projects include: the Clos La Chance Winery, Stags' Leap Winery, Beringer Vineyards, and Hanzell Vineyards.

Hall & Bartley's services include: feasibility studies, master planning, process sizing and flow analysis, architectural design, construction document preparation, government permitting assistance, construction bidding assistance, and construction administration for both new and existing winery projects.

For more information, contact:

Hall & Bartley

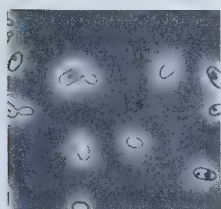
4701 Old Redwood Hwy. Ste. 2B

Santa Rosa, CA 95403

tel: 707/544-1642; fax: 707/544-1646

PLEASE SEE HALL & BARTLEY'S AD, PAGE 46.

THE WINE LAB



The Wine Lab has provided chemical and microbiological analysis since 1975, offering winemakers user-friendly technical services and practical assistance in maintaining or improving wine quality, emphasizing problem-solving and trouble-shooting.

Sometimes called "The Bad Wine Lady," founder Lisa Van de Water is unsurpassed in sleuthing the causes of spoiled wine. Lab director Nicole Haller-Wilson and enologists Harry Wetzell and Easter Trabulse are committed to helping winemakers understand what their test results mean to their wines. The Wine Lab's new Olympus BX40 photomicroscope captures microbes in the act of spoiling wine.

Current research topics include:

- **Phenolics:** Spectrophotometric assays for grape phenolic maturity and sensory characteristics are being undertaken in collaboration with Vinovation.

- **Lysozyme:** Preventing spoilage by "ferocious" *Lactobacilli* during fermentation, and by *Pediococcus* after bottling.

- **Brettanomyces/Dekkera:** Sensory contribution of isovaleric acid, a little-known component of "Brett" aroma.

- **Fermentation nutrients:** An ongoing investigation on composition and timing of yeast and ML bacterial nutrient requirements.

- **Grape nitrogen:** Rootstock and climatic effects on YAN during ripening.

The Wine Lab's global affiliations now link several countries, forming an international association. Lisa Van de

Water gives numerous seminars and consultations on technical topics to wineries in the U.S., Canada, Chile, New Zealand, and Australia.

For more information, contact:

The Wine Lab

477 Walnut St., Napa, CA 94559

tel: 707/224-7903 or 800/224-WINE

fax: 707-255-2019.

e-mail: info@thewinelab.com

website: www.e-vine.com

In New Zealand: Pacific Rim Oenology

Debra Hedley

tel: +64-3/577-9000

e-mail: pros@hortresearch.co.nz

In Chile: Vinotec Chile S.A.

Eugenio Saphores

tel: +56-2/443-1723

e-mail: vinotec@entelchile.net

In Australia: Vintessential

Greg Howell or Marco Vallesi

tel: +61-3/5987-2242

e-mail: info@vintessential.com

PLEASE SEE THE WINE LAB AD, PAGE 13.

PW BOOKSHELF

USE THE BOOK ORDER FORM IN THIS ISSUE • Your wine books promptly shipped from one source.

Concise Guide to Winegrape Clones for Professionals, Second edition
John Caldwell 56pp—\$39.00

Cooperage for Winemakers
Geoffrey Schahinger, Bryce Rankine
Manual on construction, maintenance, and use of oak barrels. User-friendly, informative text and photos. 112pp—\$25.00

**Handbook of Enology, Vol I
The Microbiology of Wine / Vinifications**
P. Ribéreau-Gayon, D. Dubourdieu, B. Donèche, A. Lonvaud
Yeast development, lactic acid bacteria, acetic acid bacteria, use of sulfur dioxide, maturation of grapes, red and white winemaking. 454 pp—\$145.00

**Handbook of Enology, Vol II
The Chemistry of Wine Stabilization and Treatments**
P. Ribéreau-Gayon, Y. Glories and D. Dubourdieu, A. Maujfan
Basic chemistry of wine formation and wine composition. Combines chemical theory with description of day-to-day work in latter stages of winemaking from clarification and stabilization to ageing processes in tanks and barrels. 410pp—\$144.00

**Knowing and Making Wine
Lexiwine**
Emile Peynaud 391pp—\$79.00
Paul Cadiou
English/French wine dictionary contains over 3,500 words and phrases on grape-growing and winemaking. \$19.95

**NEW
Micro Vinification**
M.R. Dharmadhikari
K.L. Wilker
A practical guide for home winemakers, commercial small-scale producers, and large wineries making small, experimental lots of table wine. 145pp—\$25.00

Rootstocks for Grapevines
D.P. Pongracz
Covers a wide variety of rootstock-related topics, reasons for grafting, soil adaptation, influence on crop quality and size, and general ampelography. 150pp—\$30.00

Sunlight into Wine R. Smart/ M. Robinson
Quality assurance in vineyards, canopy management and economics, improvement of canopy microclimates, importance of winegrape canopies, construction of trellis systems. 88pp—\$35.00

The Taste of Wine Emile Peynaud
A masterclass on the science, procedures, and vocabulary of the trade for the professional. An essential work of reference for the amateur. 258pp—\$39.95

**NEW EDITION
Techniques for Chemical Analysis and Quality Monitoring During Winemaking**
Iland, Ewart, Sitters, Markides, and Bruer
Sampling procedures, analytical methods and techniques, stability tests and fining trials for the laboratory. 120 pp—\$90.00

Using Grapevine Rootstocks, The Australian Perspective Peter May
Use of rootstocks in Australia including physiology and factors affecting rootstock choice. 62pp—\$19.50

**Vines, Grapes & Wines
The wine drinker's guide to grape varieties**
Jancis Robinson 280pp—\$27.95

**Viticulture, Vol. II,
Practices in Australia**
B.G. Coombe, P.R. Dry
Grapevine propagation, vineyard establishment, pruning, canopy management, irrigation, drainage and soil salinity, soil management and frost control; grapevine nutrition, grape pests, disease, protection. 384pp—\$42.50

Viticulture & Environment
John Gladstones
Selection of site, variety, and cultural practices. Detailed climatic analysis of Australian and world viticultural areas, evaluation of new viticultural sites and possible changes in the climatic conditions. 310pp—\$45.00

Wine Analysis and Production
B. Zoecklein, K. Fugelsang, B. Gump, F. Nury
A practical understanding of quick screening assays, wet chemical and instrument analysis plus results and interpretation of wine-making. 512pp—\$89.95

Wine Growers Guide
Philip Wagner
Easy to understand essentials to establish a vineyard, pruning, training, vineyard management, propagating vines, and vine ailments. 240pp—\$19.95

Wine Microbiology Kenneth Fugelsang
Provides background information, step-by-step laboratory procedures, and interpretation of results. 245pp—\$79.95

**Winery Utilities
Planning, Design, and Operation**
David Storm
Describes each of the major components of winery utility systems for planning, design, and operation. 550pp—\$99.00

Winegrape Grower's Guide (Oregon)
Oregon Winegrowers' Association
Viticulturists, researchers, and winemakers combine efforts into 30 chapters on: Selection of variety/site, rootstock, spacing, training, trellising, grapevine propagation, fertilization, pest management, yield prediction, winter injury, vineyard economics. 264pp—\$29.95

LAURENCE FERAR & ASSOCIATES



Established in 1983, Laurence Ferar & Associates is committed to quality architectural and landscape design based on a common sense approach. To research winery design, Laurence Ferar visited over 100 facilities in the U.S., France, and Italy to talk with winemakers about specific challenges and unique solutions. He has written and lectured extensively on the subject.

Like winemaking, winery design is part art, part science, and part economics. Just as *terroir* lends character to wine, the unique sense of place inherent to each site is central to Ferar's approach. Principles of sustainable development and energy-efficient design are employed to complement Ferar's clients' stewardship of the land.

The firm has broad experience in gravity-flow facilities including: Adelsheim Vineyard, Lemelson Vineyard, Pepper Bridge Vineyard, and the Pyramids Winery and Clos de la Tech (currently in design).

Other recent projects include: Lange Winery, Etude Wines, Leonetti Cellar, Rex Hill Vineyards, Red Mountain Vineyards, and Hedges Cellars.

Professional services include: site evaluation, master planning, integrated building and garden design, governmental approval assistance, and historic restoration. The firm encourages inquiries for small or large projects.

Laurence Ferar & Associates has the expertise to carry out demanding assignments and shares your enthusiasm for winemaking success.

For more information, contact:

Laurence Ferar & Associates, Inc.
1016 SW Clay St., Portland, OR 97201
tel: 503/241-5447; fax: 503/241-0826

ENOLOGIX

Enologix offers a quality management system that stretches from the vineyard to the consumer. With more than ten years of wine-industry experience, Enologix is a leader in technology for fine wine production.

Wineries using Enologix products and services have been able to maximize wine quality, develop high-performance vineyard and winery standard operating procedures, reduce operating costs, optimize brand pricing in the marketplace, and develop brand leadership.

Enologix's quality management system can be helpful to any wine producer who would like to consistently produce wine in a specific style and predict the quality and critics' ratings of new wines up to two years in advance of bottling. Proprietary chemical analysis is used to measure the intensity and balance of color and fragrance, and to measure the flavor of grapes, production wines, and finished wines.

Enologix combines this chemical analysis with viticultural and wine-making databases in such a way that wineries can easily benchmark and improve operations and quality. This gives wineries an additional set of decision-making tools they can use to maximize results and minimize risk. Since the system is designed to integrate viticultural, production, and marketing activities, it is also a useful tool for team building and organizational planning. It allows members of the management team and other staff to see exactly how their actions impact the operations of other departments and the entire winery operation.

Enologix provides objective metrics that link *terroir*, viticultural practices, and winemaking regimens with wine quality, market preferences, and national critics' ratings.

For more information, contact:

Enologix
Jenny Boyd
461 Seventh St. W. #1, Sonoma, CA 95476
tel: 707/938-9463; fax: 707/935-3299
e-mail: info@enologix.com
website: www.enologix.com

PLEASE SEE THE ENOLOGIX AD, PAGE 72.

WINE COUNTRY REAL ESTATE



**KAREN KENNY,
BROKER**

Wine Country Real Estate is a full-service brokerage specializing in vineyard and estate properties. Karen Kenny (owner/broker) has been one of Sonoma County's top producing realtors since 1977. She draws upon her background in viticulture, advertising, and art to bring a unique perspective to her work in real estate marketing and consulting.

As her business has grown, Kenny has increased her office staff to seven experienced professionals including herself. Carol Lexa, Annette Simons, Lisa Lemons, Tamra Larson, and Paul Campo are sales associates, and Mary O'Gorman is a licensed office manager.

Kenny is a successful investor, developer, and winegrape grower. She also holds a degree in viticulture from Santa Rosa Junior College. Her professional career includes experience in advertising, publishing, and film production. She has been a member of many professional organizations, including the North Coast Grape Growers Association, the Sonoma County Grape Growers Association, and the Russian River Valley Winegrowers.

Kenny has an ongoing record of success because she focuses on her clients' individual needs and tailors her approach to the special details of each situation.

For more information, contact:

Wine Country Real Estate
Karen Kenny
421 Healdsburg Ave., Healdsburg, CA 95448
tel: 707/433-2600; fax: 707/433-2052
email: kfine@sonic.net
website: www.winecountryprop.com

PLEASE SEE WINE COUNTRY REAL ESTATE'S AD, PAGE 38.

VINQUIRY, INC.

Vinquiry provides analytical services, consulting, and supplies to the wine and distilled beverage industries. Vinquiry's expert attention to detail makes the critical difference with experienced enologists paying close attention to the details of analysis and supplies for over 20 years. Vinquiry provides expert, personalized consultations, testing, planning, and the best-targeted products. Vinquiry is BATF-certified for both wine and distilled beverages.

Vinquiry has been serving North American winemakers from its main office in Sonoma County since 1979. To better serve California central coast clients, Vinquiry opened a satellite office in Santa Maria, CA, in 1999. Both facilities carry on the Vinquiry tradition of combining high-quality analytical services with a uniquely knowledgeable and accessible staff. Both laboratories are well equipped to meet analytical needs at harvest time and beyond.

Vinquiry offers a comprehensive range of fermentation products for the wine industry. Clients select from more than 35 yeast isolates to make suitable matches for fermentation that consider grape variety, nutrient status, desired aroma and flavor profiles, and wine style. Vinquiry is the exclusive North American distributor for the ENOFERM line of specialty yeast developed by Dr. Paul Monk and produced by Lallemend, Inc.

In June 2001, Vinquiry released the 2001 supplement to its June 2000-June 2002 catalog of services and products. To request a copy, you may call 707/838-6312 or fax your request to 707/838-1765 or log on to www.vinquiry.com and fill out the online request form.

For more information, contact:

Vinquiry, Inc.

7795 Bell Rd., Windsor, CA 95492
tel: 707/838-6312; fax: 707/838-1765
e-mail: info@vinquiry.com
website: www.vinquiry.com

PLEASE SEE VINQUIRY'S AD, PAGE 36.

NATIONAL BANK OF THE REDWOODS

Looking for *quick* and *easy* banking solutions from *nice* people? At National Bank of the Redwoods (NBR), no two projects are the same. Loans are structured to meet your individual needs. Whether you're interested in refinancing property, obtaining equipment financing, or applying for a vineyard development loan, NBR will stand behind you every step of the way.



NBR was established in 1985 to fulfill a need in the market for local decision making. Since then, NBR has expanded to five branches in Sonoma County and a branch in both Mendocino and Lake counties, serving businesses in those local communities. NBR's focused approach on customer service has made it a top business bank in the North Bay.

Need to know what's going on in your account? NBR offers the most comprehensive cash management system available. NBR pioneered same-day transaction reporting when it created electronic banking 15 years ago. Now, through the internet, the same functionality is available over the web. NBROnline Banking offers access to an unlimited number of personal and business accounts, so you can manage cash flow and balances like never before. Log on to www.nbronline.com and learn more about NBR's products and services and view up-to-the-minute transaction reporting!

For more information, contact:

National Bank of the Redwoods

111 Santa Rosa Ave., Santa Rosa, CA 95404
tel: 707/573-4800; fax: 707/544-3115
e-mail: mleonard@banknbr.com
website: www.nbronline.com

PLEASE SEE NBR'S AD, PAGE 38.

O'BRIEN WATTERS & DAVIS, LLP

Since its founding in 1982, O'Brien Watters & Davis, LLP (OW&D) has been committed to providing superior and effective legal services and high-quality representation for clients throughout California and the wine industry.

John R. O'Brien, founding partner, specializes in real estate, corporate, and business law. Founding partner Daniel E. Davis is both an attorney and a Certified Public Accountant and is a California State Bar Certified Specialist in taxation law. The firm's litigation department is headed by founding partner, Michael G. Watters.

Toni L. Griffin is of counsel to the firm. Her practice emphasizes alcoholic beverage, corporate, and business law (particularly as they relate to wineries, vineyards, and the industries and services that support them).

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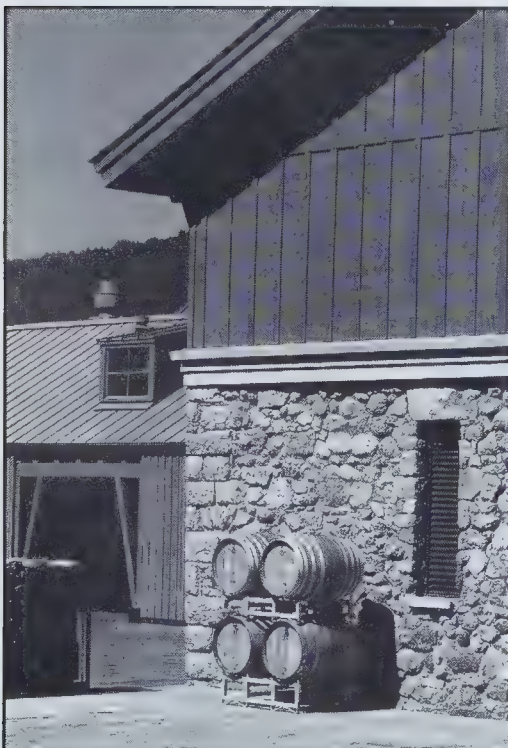
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In addition to consultative work, other specialties include fermentation trouble-shooting, filterability testing, and BATF-certified analysis for export. The laboratory is also certified by the State of California for water analysis (including well and waste water).

In addition to outside services, the laboratory also provides technical support for customers who use enzymes, tannins, gelatins, and adjuvants offered in Scott's portfolio of winemaking supplies. These products have been shown to be useful winemaking tools that can target specific winemaking problems, such as clarification, color stability, structure, and harsh tannins.



Fruit exposure — Desirable in hot climates?

I wrote *Sunlight into Wine* when I was a government viticultural scientist in New Zealand in the late 1980s. Obviously, much of my commercial and research experience at that time was in cool climates, which contributed to a distinct bias in the book. So many of the guidelines presented there, as, for example, vineyard scoring and fruit exposure, were relevant to cool climate viticulture.

I believed at that time that the same principles also applied to hot climates, based mainly on my personal research experience. This was in the hot climate around Roseworthy in Australia, where I found, in 1980, that canopy shade reduced yield and wine quality, including red wine color and phenols. This study was made using the variety Syrah (or Shiraz), with the most exposed fruit on the newly-formed Geneva Double Curtain (GDC) system.

However, since then I have had cause to reconsider my earlier findings. Studies have shown that excessive sun exposure inhibits color development; one can sometimes see a few “pink” berries on the most exposed part of the bunch. These bunches often sit on top of the canopy, and so are exposed to direct sunlight for most of the day. This observation seems to be reinforced by studies of Mark Kliewer at UC Davis using a phytotron, which indicated that high temperatures, for some varieties at least, inhibit color development.

High temperature and high exposure

There is a paradox here. It does seem clear that very shaded fruit produces inferior wine, with less color and phenols, and vegetative characters to boot. On the other hand, we know that sun-exposed fruit becomes heated up to 3° to 8°C above air temperature. This heating effect is greater when the sun is shining brightly, when wind is low, when berries are dark colored, and when the bunch is moderately compact. Interestingly, water-stressed vines are more prone to high temperature effects, even though berries show little evidence of being able to cool themselves by transpiration, as do leaves.

Growers often talk about “sunburn,” but in my opinion this term is used too loosely in the industry. Classical sunburn is a circular spot of dead skin tissue, on that part of the berry facing the western sky, where high sunlight is usually combined with high daytime temperatures. Often I hear other conditions described as sunburn, even though they can be as harmless as sun effects on spray residues.

So here is our paradox. We require sun exposure to avoid shading effects, but we need to avoid very high temperatures which inhibit color development. This would seem to be a particular problem in hot climates.

Sun exposure effects in San Joaquin Valley

A study from Juliet Bergqvist, Nich Dokoozlian, and Nona Ebisuda from UC Davis and Kearney Ag Research Station has solved this riddle for us (See *American Journal of Enology &*

Viticulture, 52:1, pp. 1–7, 2001). They compared Cabernet Sauvignon and Grenache vineyards oriented east-west at Kearney near Fresno in the hot San Joaquin Valley of California.

They carefully selected bunches by exposure categories, from well exposed to very shaded, on both north and south sides of the vines. Of course, bunches on the north side essentially do not see the sun, whereas those on the south (equator) side can be in direct sunlight most of the day, depending on location of surrounding foliage and shading patterns. The researchers also measured light on the bunches and temperatures of the berry centers.

Exposed berries were up to 7°C hotter at the center than was the adjacent air, and more than 10°C hotter than shaded berries. And if these readings were of center temperature, the temperature at the skin could be several degrees hotter! As expected, south side berries were substantially hotter than those on the north, and temperature was higher for those berries in bright sunlight.

There were interesting effects on the fruit. It is significant to note that only the outermost berries (facing the inter-row) were taken for analyses; in all that follows, the differences may be smaller if all berries on the bunch were analysed.

South side berries were smaller, especially for Cabernet Sauvignon. Strangely, the berry mass for the most exposed Grenache berries on the north side was smaller. Most of the exposed berries on the south side were smaller for both Grenache and Cabernet Sauvignon, suggesting high temperatures (or high light?) may inhibit berry size.

Sugar levels were highest for intermediate exposure for Grenache and higher for the south side. For Cabernet Sauvignon, the shaded fruit had lowest sugar, but the most exposed fruit was similar to intermediate exposure. For both varieties, south side fruit had higher sugar concentration. Acidity was lower on the south side for Cabernet Sauvignon, with less apparent effect for Grenache. The effects on pH mirrored those for sugar.

Effects on anthocyanin and total phenolics were most interesting. For Grenache and Cabernet Sauvignon, increasing exposure gave higher color and phenols for north side fruit. For the south side, there was evidence of intermediate exposure levels being correlated with maximum anthocyanin, and to a lesser extent with phenols.

Conclusion

The authors conclude that improving fruit exposure for wine quality reasons is desirable only for the afternoon-shaded (northern) side of vineyards. For the fruit on the side facing the sun most of the day (southern), some degree of fruit protection is desirable, and intermediate exposure is preferred. They believe that high temperatures of southern-exposure fruit can overcome the beneficial effects of increased exposure to sunlight.

Some people in Australia use the expression “dappled sunlight” to describe intermediate fruit exposure, inferring a dynamic pattern of sunflecks. That seems appropriate. Maybe my early studies with Syrah in hot climates were not as universally applicable as I considered at the time. In any

SMART VITICULTURE

event, if you look at *Sunlight into Wine*, I have always been cautious about 100% exposure.

This study brings up several questions. It would be interesting to repeat the research in both a warm and a cool climate, to see if similar effects were observed. It would also be interesting to study east and west side fruit from north-south rows — is there a difference? Nick Dokoozlian advises that he has done this study and has found differences, and that the report is being prepared. I look forward to this with interest. And for all of these studies, it would be useful to go to the next step of winemaking to evaluate differences in the glass.

My take-home message is to avoid excessive exposure of fruit to the southwestern sky in hot climates in the northern hemisphere. This may cause people to reconsider practices of leaf stripping (which I think is typically done too severely in California), and also row alignment and trellis choice.

I conclude with my congratulations to the University of California team for a nice study which has far-reaching implications for our grape-growing practices. ■

Dr. Richard Smart, "the flying vine-doctor," is an international viticultural consultant based in Australia. He is also the visiting professor of viticulture at Cal Poly, San Luis Obispo, CA. Contact him by e-mail: vinedoctor@compuserve.com. Read about Dr. Smart's business, including his consulting schedule, educational wine tours, and seminars, at his home page <http://www.smartvit.com.au>. He visits America frequently and his consulting schedule is arranged by Vinquiry in Windsor, CA, tel: 707/838-6312 and <http://www.vinquiry.com>

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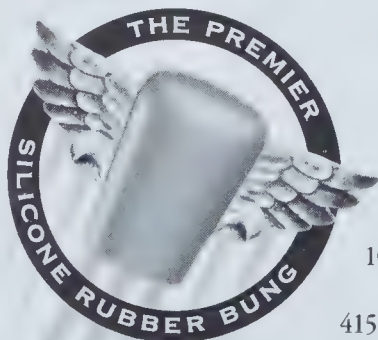
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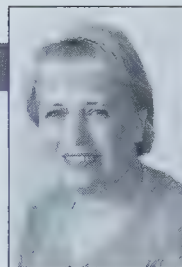
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VINIDEA

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by Sue Weeks

A quality experience...

By now you are all in the midst of vintage, and quality implementation is understandably the furthest thing from your mind. Many of you will have engaged extra help for vintage and some of that help may have been sourced from other winemaking areas around the world. In this column, I would like to discuss the opportunities experienced by these international wine industry personnel and also highlight the potential opportunities available to you and your staff.

International Exchange Program

It may surprise you to know that there are more than 350 international interns currently working in the U.S. They come from more than 20 different countries around the world.

These people are all participants in a program that commenced almost 12 years ago as a pet project of Communicating for Agriculture (CAEP), a non-profit organization based in Fergus Falls, MN. This organization deals primarily



Sue Weeks sitting down on the job during her "Quality Experience" at Quivira Vineyards (Healdsburg, CA) in the Dry Creek Valley.

with exchange programs for the farming community, giving young farmers the opportunity to spend time learning the farming methods of another country.

Unlike CAEP's enology program, placements for young farmers are for much longer than the three-month harvest period. They are more likely to be nine to 12 months in duration. In 1989, the enology program commenced with just

a few eager trainees and wineries, and it has now grown to such an extent that demand for trainees has exceeded supply.

Objectives of the program are to:

- Provide trainees with experiences based on practical training exchange programs.
- Provide trainees with the opportunity to develop an understanding of the ways of life and cultural patterns in the hosting communities.
- Strengthen and improve mutual understanding between the countries involved through establishment of contacts between trainees and their hosts.
- Promote recognition of cultural, technical, and academic values of the program.

In 1999, I was one of those trainees. Thanks in part to Don Neel, publisher of *PWV*, I travelled from my home base in Australia to do my internship in the Dry Creek Valley, working with Grady Wann and the team at Quivira Vineyards. I can thus speak from experience about the internship program, having been there and done that. Both vintages since then I

have yearned to return and do it all over again, but time and financial constraints have conspired to make it a one-time experience for me.

The "tour of duty" commences with an orientation seminar held in several regional areas, the biggest at Santa Rosa's Flamingo Resort Hotel. This seminar takes place over three days, introducing trainees to life in America. It includes tours of wineries, instructions on obtaining a social security card, and guidelines for staying clear of law enforcement agencies. As you can imagine with several hundred enthusiastic young people gathered in one place, things can get rather rowdy!

This body of young, enthusiastic wine industry personnel forge a strong network that lasts much longer than their short stint in the U.S. It strengthens what is increasingly a global industry of like-minded people who work to produce the same product — aiming for the highest quality using available resources. We are so lucky to be a part of this industry! *What many people in the U.S. industry do not realize is that the same opportunity is available to them.*

Communicating for Agriculture, in conjunction with Bibber International (its representative in Australia), is offering positions in the Australian industry for young and enthusiastic people who might like to include an Australian vintage on their resume. Most of the positions available are in the cellar, though there are a very few available in the wine-making/viticultural areas.

What are the criteria?

Are you:

- Age between 21 and 35?
- Experienced or qualified in some facet of winery operations?
- Interested in the Australian wine industry?
- Interested in discussing winemaking techniques with people from wine regions throughout the world?
- Curious about what life is like in Australia?
- Eager to include training at an Australian winery on your resume?

When is vintage in Australia?

Vintage in Australia is mainly from January to May depending on region. Vintage in the warmer climates of the Hunter Valley and the Riverland start early in the new year while the cooler climates start mid-March. The majority would commence around mid-February. This of course depends a lot on Mother Nature!

How much does it cost?

Well, this is the bad news. It is expensive. The exact fees for 2002 have not been set yet but they are likely to be in the vicinity of \$3,500 to \$4,000, which includes all administrative fees, airfare, and travel insurance (which is compulsory). There are some minor consolations though. First, you may be entitled to a grant/scholarship from CAEP for some of the administrative expenses. Second, all the expenses may be tax deductible against income earned in the U.S. Please check with your tax accountant.

WINERY LABORATORY QUALITY

Remuneration

Wages for this experience are usually based on government or union-regulated awards. The hourly rate is likely to be somewhere around the AU\$12 mark with overtime (time and a half) paid for hours worked beyond eight hours/day. Dollar for dollar, the cost of living is about the same in Australia as it is in the U.S., so it will probably be enough for you to live on if you are not extravagant. However, as you can see, it will not make you rich, especially with the current exchange rate at around \$0.52 for every Aussie dollar.

You may be thinking, "I can always go to Australia independently and get work." And you are right—you can pursue that strategy if you prefer. You could also find a job in the Australian wine industry and get the winery to sponsor your visa. But please remember that if you enter Australia this way, you will pay 29% tax on every dollar you earn. If you enter under the training visa offered by the program, you will pay tax as though you are an Australian resident—which works out to a rate somewhere around the 10% tax mark. This represents savings which are far greater than the cost of the program fees, so please bear this in mind when making your decision.

The program fees also include an orientation seminar where you will meet other trainees from the U.S. and other

countries and get help with bank accounts, taxes, and other matters during your time in Australia.

Plus, the news gets even better. CAEP has program partners all over the world, so Australia is not your only choice of destination.

How do I apply?

To find out more information about the enology programs offered by Communicating for Agriculture, contact Beverly Bianchi at 800/432-3276 ext 3510. There will be only 30 places available in Australia for Vintage 2002, so if you are interested, it would pay you not to waste any time. ■

Sue Weeks is an Australian wine laboratory consultant. She provides assistance in areas of formal or informal quality system implementation, method validation and troubleshooting, laboratory setup, personnel selection, and staff training. She also facilitates international wine industry training in conjunction with the Communicating for Agricultural Exchange Program (CAEP). She visits America often and can be contacted through the Bibber International website at www.bibber.com.au or tel: 61 8-8563-2422 or fax: 61 8-8563-2433. She can also be contacted through Gordon Burns at ETS Laboratories at tel: 707/963-4806.

**Leaf canopy structure**

Continued from page 18

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PRESERVING A CULTURAL TREASURE

Who would ever think that a 120-year-old greenhouse is worth a second look? Nestled in the northeast end of San Francisco's Golden Gate Park is the Conservatory of Flowers, a late Victorian-style structural gem that was nearly destroyed during the severe winter storms of 1995-96. The delicately configured glass and redwood frame structure was not intended to withstand wind gusts of 90 mph.

During that same December 1995 storm event, some 1,500 specimen trees in the park were toppled or so badly damaged that they had to be removed. Adding to the Conservatory's woes, the very rare horticultural collection it houses contains tropical and pan-tropical species that require the high humidity found in their favorite growing environments.

This humidity, San Francisco Parks Department engineers have concluded, is the culprit in a general weakening of the Conservatory's glass frames and supporting arches. The central structure (almost church-like with a "three-tiered cake" arrangement) rises some nine stories and is flanked by two 120-foot by 100-foot wings with an eye-pleasing, semicircular roofline that is created by the redwood arches.

Reconstruction is underway with piece-by-piece replacement of failed or badly rotted members — a technique that to me is reminiscent of my early youth balsa wood airplane model assembly methods.

On a recent visit, I got the distinct impression that the craftsmen employed to carry out the restoration are more artisans than carpenters and glaziers. Or perhaps they are San Francisco's version of the Sistine Chapel painters, who were charged with touching up and preserving Michelangelo's cherished work.

If you are inspired to learn more about this project (and perhaps donate money to help fund the effort), visit the website www.sfparks.org

Bridge cranes and monorails

Bridge cranes or monorails are generally the lifting devices of choice for bin/gondola dumping at the crush/press pit. Very small wineries that prefer ultra-gentle handling of grapes or with limited crush/press equipment input capability may opt for a low-tech grape-dumping approach.

Some wineries, for example, employ 4' x 4' x 2' fruit bin dumpers that attach to a conventional warehouse forklift. The hydraulic device clamps the bin on both bottom and sides and rotates the bin until it spills its contents into the press or crusher hopper.

At the zenith of the gentle fruit handling scale are the wineries producing sparkling wines that pick and transport grapes in 35-pound-capacity plastic lugs that are emptied by hand at the press. Other than possible damage to the workers' musculoskeletal systems, this picking lug system is nearly accident-free.

Bridge cranes and monorail cranes differ from each other in that bridge cranes have transverse motion for the cable hoist and longitudinal motion along the support rails that



by D.R. Storm, PhD, P.E.

create the "bridge." In the monorail crane, only the cable hoist is moveable, and the end support columns are fixed in location.

Monorails with a hoist lifting capacity of 6,000 pounds or less are exempt from the industrial crane safety provisions of OSHA and their state equivalents.¹ The bin emptying sequence with a crane or monorail hoist is as follows: Typically, so-called "valley gondolas," (aka "bins") on flatbed trailers (two per trailer) are capable of hauling about five tons per bin or 20 tons total for the two trailers. Dimensionally the gondolas are approximately 11' x 8' wide and 4' 3" inches high.²

The cable drum hoist has to be capable of lifting approximately one-half the weight of the bin contents plus one-half the tare weight of the bin (bins are steel or fiberglass with the former weighing about 2,200 pounds and the latter 1,080 pounds). Thus with a possible mixed bag of steel and fiberglass bins arriving at the winery, the hoist should be capable of lifting a minimum of 11,100 pounds.

Safety issues

For many wineries, the truck driver often winds up being the gondola hoist operator and hoist hook setter, as the crush/press pit winery employee has the hoist operation responsibility only as a collateral duty.

Accidents happen when the truck driver, who is anxious to leave the crush/press area, forgets to unhook the hoist from the last gondola that was emptied. Hoist, hoist frame, and gondola can be seriously damaged. Certainly injuries are possible if the hoist is dislodged from its support rail, if a hoist cable fails, or if the gondola is ripped from its anchorage on the flatbed trailer.

The control for the cable hoist and its transverse/longitudinal travel operation can be umbilical-cord-connected or actuated with handheld electromagnetic energy.³ A cordless unit allows the hoist operator more freedom of movement to observe the bin/gondola tipping action from several locations. The hard-wired control requires that the power cable and control umbilical be suspended from the cable hoist beam via a festoon arrangement with both conductors able to expand or contract in concert with the movement of the cable hoist. The handheld remote control eliminates this electrical/electronic complexity.

While the bin/gondola is being lifted from the flatbed and tipped toward the receiving hopper, the cable hoist must continually be repositioned to remain directly over the point of hook attachment as the gondola's lifting eye moves through a circular arc. Electric brakes on the cable hoist wheels should prevent the unwanted transverse movement of the hoist during lifting; however, the steel-on-steel contact (wheels to support beam or monorail) does not prevent occasional slippage of the locked wheels when the cable hoist is tensioned.

Hoist cables should be checked before each harvest to observe for frayed or worn sections. Lubricating the often difficult-to-access hoist machinery is also an annual task. If the crush/press bay is uncovered (no roof), then the hoist and cables are at the mercy of the elements for the entire year.

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Hydraulic cranes, which are an adaptation of truck-mounted stiff-leg cranes, are being used by some wineries for savings in capital cost and maintenance.³ The crane boom can be articulated to provide the operator with the optimum control. Part of the capital savings results from elimination of the bridge crane or monorail structural steel frames and transverse crane rails.

Safety training services available

At least one supplier of lifting equipment has a "traveling safety show" that is tailored to the winery's particular complex of installed equipment.³ Maintenance and inspection programs can also be included. I encourage wineries to take advantage of safety-training opportunities as a way to protect equipment and employee health. ■

David Storm is a consulting civil/sanitary engineer specializing in winery utility systems. He is author of the reference book, Winery Utilities: Planning, Design and Operation. Aspen Publishers, December 1996. (E-mail: domainedehiver@yahoo.com).

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How to select a good distributor

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need or want your entire product line. Agree on sales projections by varietal for an entire year based on specific market conditions and seasonality. If your wines are allocated, offer the distributor enough for mutually agreed upon target accounts.

Distributors only want brands that will be profitable for them. They usually seek out good value items to sell in volume quantities or limited production wines with high profit margins.

Frequent communications are imperative for both parties to build business and succeed. Wineries are often guilty of shipping their first order to a new wholesaler and never checking back with the distributor's principals on the status of their new introduction. Don't assume they know what to do. Establish clear, measurable goals within a specific time frame that are attainable. If goals are set too high and salespeople are unable to achieve

them, your performance expectations can act as a demotivator, and they may lose interest in your brand.

Distributors will need to pull samples from their shipments to introduce sales staff to the new line and to sample the wines to potential new accounts. Establish a clear sampling policy for charge backs for samples. Most producers agree on a "50% policy," in which the wholesaler will invoice the winery monthly for one half of the laid-in cost of the wines. Other wineries may offer a specific percentage (usually 1% to 4%) of the total annual cases sold or allocated.

Occasionally, distributors may ask new producers to "give" them 100% samples to help launch their brand. This negotiation should be weighed with your intent to "partner" and share in the promotion expenses of your chosen wholesaler.

Note the distributor's fiscal year because it may not coincide with

yours. Sales and depletion reports may seem skewed because its "year" may start in April or October while your records may be based on calendar year. Many wholesalers "push" sales during the last month or two of their fiscal year to increase total annual sales figures. They also may not order heavily during those months in an effort to deplete their existing floor inventories at the end of their fiscal year.

By selecting and treating distributors as business partners and frequently communicating with them, your efforts to build business together can turn into a long-term working relationship that leads to your mutual benefit and increased profit levels. ■

Veronica Barclay, is the owner of Barclay & Company, a wine marketing consulting firm based in St. Helena, CA. She specializes in helping wineries gain exposure and increase sales. Contact her at www.barclayandco.com or 707/963-3185.

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